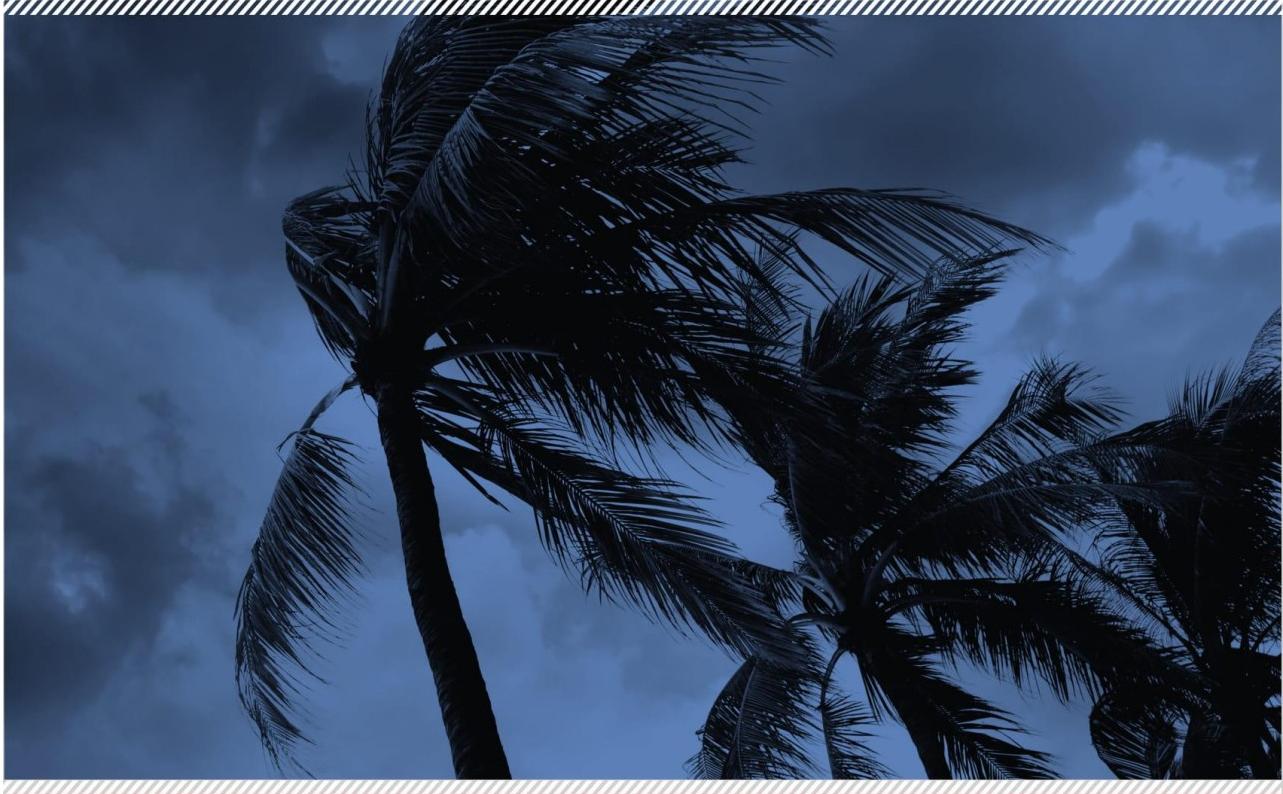




CITY OF
ORLANDO
EMERGENCY MANAGEMENT

COMPREHENSIVE EMERGENCY MANAGEMENT PLAN



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Record of Changes

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Executive Summary

The Comprehensive Emergency Management Plan (CEMP) is the master operations document for the City of Orlando in responding to all emergencies, as well as catastrophic, major, and minor disasters. The City of Orlando is encouraged by Florida Statute Chapter 252 and authorized by City of Orlando Policy & Procedure 500.3. The City of Orlando adheres to City Ordinance Chapter 43A. The CEMP defines the responsibilities of all levels of Federal and State government, private, volunteer, non-governmental organizations and departments that make up the City of Orlando Emergency Management Team.

The CEMP establishes the framework for an effective system to ensure that the City of Orlando Emergency Management Team can mobilize as a unified emergency organization, to safeguard the well-being of the City of Orlando residents and visitors. The CEMP unites the efforts of these groups under the Emergency Support Function (ESF) format with a designated lead agency for a comprehensive approach to mitigation, planning, response and recovery from identified hazards. This organizational structure is compliant with the National Incident Management System (NIMS) and incorporates the principles outlined in the Incident Command System (ICS).

The City of Orlando utilizes NIMS as the standard procedure for incident management in the Orlando jurisdiction. The staff members of the Office of Emergency Management and the City of Orlando Emergency Management Team are required to complete the appropriate NIMS training and other training as it relates to their emergency support function.

This plan is structured to parallel State and Federal activities outlined in the “State of Florida Comprehensive Emergency Management Plan” and the “National Response Framework,” and describe how State, Federal and other outside resources will be coordinated to supplement city resources and response.

The CEMP is divided into three sections:

1. The Basic Plan

The Basic Plan includes the purpose, scope and methodology of the plan, direction and control, organizational structure, alert notification and warning, the five phases of emergency management (prevention, preparedness, mitigation, response, and recovery) actions, responsibilities, authorities and references.

2. The Emergency Support Function Annexes

The Emergency Support Function Annexes outline the agencies responsible for specific actions and duties in the event of a disaster and/or emergency. This annex outlines the Emergency Support Function for each ESF 1-20 in the emergency operations center. These annexes include activities before, during, and immediately following activation. For the City of Orlando, the Emergency Support Function Annex is the current the City of Orlando standard operating guideline for Emergency Support Function personnel. These annexes are available in a separate document.

3. Support Annexes

The Support Annexes include the following:

- *Recovery Annex – Annex I*

This annex outlines the steps taken during the recovery efforts following an emergency or a disaster.

- *The Mitigation Annex – Annex II*

This annex outlines the mitigation activities before, during, and immediately following a disaster. For the City of Orlando, the Mitigation Annex is the current Orange County Local Mitigation Strategy, which the City of Orlando is a participating member.

- *Hazard Summary Annex – Annex III*

The Hazard Summary Annex provides a snapshot of the Risk and Vulnerability Assessment as well as Consequence Analysis of each core hazard or hazard of most significance that could potentially impact the public, responders, and continuity of operations including the continued delivery of service, property, facilities, infrastructure, environment, economy and public confidence. This annex is in a separate document.

- *Communication Annex – Annex IV*

The Communications Annex provides a list of assets and capabilities available at the EOC and alternate EOC site.

- *Pre, Post, and No Warning Checklist Annexes – Annex V*

The checklists are to provide a sequential listing of tasks or protective measures for each department. These checklists can be modified for a variety of disaster scenarios.

Introduction

The City of Orlando Comprehensive Emergency Management Plan (CEMP) is a strategic operations oriented plan that addresses coordinating city and inter-city prevention, preparedness, mitigation, response, and recovery activities. The CEMP is consistent with the National Incident Management System (NIMS).

The CEMP Basic Plan describes the basic strategies, assumptions, and mechanisms through which the city will mobilize resources and conduct activities to guide and support the City's Emergency Management Program. To facilitate effective inter-governmental operations, the CEMP adopts a functional approach that groups the type of assistance to be provided under Emergency Coordinating Officers (ECOs) and Emergency Support Functions (ESFs) to address functional needs at the city level. Each ECO/ESF is headed by a lead agency, which has been selected based on its expertise, authorities, resources, and capabilities in the functional area.

Purpose

The purpose of the CEMP is to establish uniform policy and procedures for the effective coordination of response to a wide variety of hazards. These hazards may differ in size and severity and affect the health, safety, and/or general welfare of the residents and visitors of the City of Orlando. The CEMP addresses these hazards through the following five phases of emergency management:

1. Prevention

This phase is composed of actions to avoid an incident or to intervene or stop an incident from occurring. Examples of this phase include the sharing of information and/or hardening of critical infrastructure and facilities.

2. Preparedness

This phase involves preparing for prompt and efficient response and recovery activities to protect lives and property affected by an emergency and/or disaster. Activities within this phase include developing plans, conducting training and developing and executing exercises.

3. Mitigation

This phase involves activities designed to reduce or eliminate risks to persons or property or to lessen the actual or potential effects or consequences of an incident.

Mitigation measures may be implemented before or after an incident and are intended to reduce vulnerability to hazards over the long term.

4. Response

This phase of emergency management deals with responding to emergencies and/or disasters utilizing all systems, plans, and resources to safeguard the health, safety, and welfare of citizens and visitors. The response phase can include dispatching first responders to emergencies and the activation of an Emergency Operations Center.

5. Recovery

Recovering from an emergency and/or disaster involves providing for the short-term assistance, which includes the rapid and orderly restoration and rehabilitation of persons and property affected. The long-term needs of citizens such as mental health counseling and individual needs not covered through State or Federal programs.

Scope

The CEMP plan establishes the coordinating structures, processes, and protocols required to integrate the specific statutory and policy authorities of various City of Orlando departments and agencies into a framework for action to include prevention, preparedness, mitigation response, and recovery activities.

The CEMP addresses the various types of emergencies that are likely to occur in the City of Orlando, from local emergencies to major or catastrophic disasters. It further provides policies and procedures for disseminating warnings, coordinating responses, ordering evacuations, coordinating opening shelters, and for determining, assessing, and reporting the severity and magnitude of an emergency and/or disaster. It further establishes direction and control by directing resource requests for municipalities to County, County to State, and State to Federal based on Florida Statute Chapter 252.

The CEMP details the City of Orlando Emergency Management Team which is composed of city departments, support agencies, profit and non-profit organizations, as well as county, state and Federal liaisons. The mission is to safeguard the citizens and visitors by ensuring the rapid response and recovery of the city to a variety of hazards. The CEMP establishes the organization, concepts, and terminology under which the City of Orlando Emergency Management Team will operate by defining the mechanisms to facilitate the delivery of immediate and prolonged assistance by:

- Establishing fundamental policies, program strategies, and assumptions.

- Establishing a concept of operations spanning the direction and control of an emergency and/or disaster from initial monitoring through post-disaster response and recovery.
- Defining the roles and responsibilities of elected and appointed government officials, city departments and agencies, private industries, and volunteer and civic organizations.

The CEMP provides guidance for actions necessary for recovery and mitigation in the corresponding annexes, with further details located in the Local Mitigation Strategy (LMS). These plans outline recommended actions for recovery and mitigation efforts following a disaster.

The LMS is a strategy adopted by Orange County, following approval from the State and FEMA, to address and mitigate potential hazards to minimize the impacts to the County after a disaster. The LMS Working Group was established to make the whole community more resistant to natural and technological hazards by identifying and prioritizing mitigation projects. Following a disaster, the LMS Working Group convenes to discuss these projects and evaluate ways to implement them to reduce or eliminate the threats from future hazards.

Methodology

The City of Orlando CEMP was developed by the Office of Emergency Management (OEM) in accordance with the CEMP plan criteria (Form CEMP-001) established by the Office of the Governor, Division of Emergency Management. The principal planning effort is the responsibility of OEM and accomplished through a combined collaborative effort of various organizations within the City of Orlando Emergency Management Team. The team consists of the following:

- Transportation
- Information Technology
- Public Works
- Fire Service
- Resource Management
- Volunteer and Donation Management
- Facilities Management
- Mass Care
- Public Information
- Business and Industry
- Law Enforcement

The CEMP incorporates the concepts, assumptions, and terminology of the National Incident Management System (NIMS), as well as the National Response Framework (NRF), and institutionalizes the use of the Incident Command System for field response. OEM ensures that the CEMP remains current through maintenance, and distribution of the CEMP.

The development of the CEMP used the basic planning process methods of:

- Conducting a Vulnerability Assessment.
- Conducting a Hazard Analysis.
- Developing the CEMP to include necessary plans, annexes, appendices, and procedures.
- Receiving approval of the plan from the County and adopt via resolution by the City of Orlando Council.
- Testing the plan through training, exercises, and real-world emergencies and disasters.
- Revising and maintaining the plan.

The CEMP is reviewed and approved every five years by Orange County. Following approval by the Orange County, the City of Orlando Council adopts a proclamation implementing this plan for use by all city departments and divisions. After the proclamation is signed, the plan is then distributed to the City of Orlando Emergency Management Team members and available on the city's TeamLink Intranet. It is available to the public upon request.

Testing of the CEMP happens throughout the year by conducting training, developing exercise capabilities and scenarios, and responding to real-world emergencies. When the Emergency Operations Center (EOC) is activated, the CEMP is referenced and then followed based on the type of emergency. When a deficiency is found within the CEMP, the deficiency is noted and evaluated to determine potential solutions. Additional training or exercises may be needed to educate responders and re-test their capabilities to prepare for the next emergency event.

The CEMP is maintained and reviewed annually by the Office of Emergency Management. When non-critical corrections are made, these corrections are noted on the record of changes page for review. However, if a correction may be detrimental to the safety of the staff and residents of the city, a critical update of the CEMP will be completed immediately by OEM Staff. A revised version of the CEMP will then be published and distributed to all of the City of Orlando Emergency Management Team and other relevant personnel or groups.

Evaluation, Maintenance, and Revision

Plans are evaluated on a continuing basis between normally scheduled updates. The evaluations are utilized to improve and enhance the effectiveness of the plans during the next update. The evaluation methods include the City of Orlando Emergency Management Team and stakeholder's feedback, critique and analysis of training, exercises, after-action reports, corrective actions, real-world events and the ongoing review of Emergency Management best practices.

The overall coordination of the development and updating process is the responsibility of the Office of Emergency Management (OEM). OEM sets schedules for the updating, tasks city departments with review actions, coordinates with applicable Federal, state, and county agencies, and takes such other actions necessary to complete a plan update. The Basic Plan, Recovery Annex, Mitigation Annex, ESF Annex, and the Hazard Summary Annex are reviewed on an annual basis or if the evaluation process dictates revisions to improve and enhance the effectiveness of the plan changes can be made before the next scheduled update. The CEMP is maintained in accordance with the Plan Maintenance Standard Operation Procedure.

ESF's Annexes are under the coordination of designated lead primary agencies, and it is the responsibility of the primary agencies to coordinate with the identified support agencies for the specific ESF, to gather input to ESF modifications and improvements, and to complete the necessary modifications to the ESF. Designated support agencies are responsible for assisting the primary agency in preparing the update of the ESF.

The CEMP is a living document maintained and revised by the Office of Emergency Management. Changes to this document can be made at any time with the approval of the OEM Manager and do not need board approval as long as the intent of the plan does not change. A revised version of the CEMP will then be published and distributed to all City of Orlando Emergency Management Team members via electronic means.

Promulgation Statement

This plan provides a framework through which the City of Orlando, as a city, plans and performs the respective emergency functions during a disaster. It assists the governmental and non-governmental partners of the City of Orlando to function effectively, regardless of disaster phase, also providing support to on-scene emergency response personnel working to preserve life and property for the citizens of the City of Orlando.

With the promulgation of this plan, the National Preparedness System and the National Incident Management System (NIMS) standardized procedures for managing

personnel, communications, facilities and resources improves the city's ability to utilize state and federal funding enhancing local and state agency readiness, maintain first responder safety, and streamline incident management support and processes as adopted. A proclamation adopting this plan is maintained.

Department Responsibilities

Since 2013, the State of Florida mandates that the Comprehensive Emergency Management Plan (CEMP) include an Acceptance of Responsibility form for each lead agency. This form serves as an agreement between the respective ECO/ESF and the Office of Emergency Management.

The form states that ECO/ESF Lead Agencies are responsible for adhering to all policies, procedures, and responsibilities noted within the City of Orlando's Comprehensive Emergency Management Plan.

It is the intent of assigning city departments and partnering organizations as lead agencies for Emergency Support Functions (ESFs), and to ensure accountability by an agency for certain emergency actions that may occur before, during and after a major disaster.

For copies of letters acknowledging and accepting plan responsibilities from city departments and partner agencies, refer to "Appendix A" of the CEMP.

CEMP Distribution List

- American Red Cross
- Central Florida Regional Transportation Authority (Lynx)
- Orange County Office of Emergency Management
- Greater Orlando Aviation Authority (GOAA)
- Orlando Utilities Commission (OUC)
- Orange County Public Schools (OCPS)
- City of Orlando Economic Development Department
- City of Orlando Families, Parks, and Recreation
- City of Orlando Fire Department
- City of Orlando Housing and Community Development
- Orlando Venues
- City of Orlando Police Department
- City of Orlando Public Works
- City of Orlando Transportation

- City of Orlando Office of Communications & Neighborhood Relations
- City of Orlando Office of Community Affairs
- City of Orlando Chief of Staff
- City of Orlando Chief Administrative Offices
- City of Orlando Office Business & Financial Services
- City of Orlando Attorney Office

Distributed Changes

Any changes requested to the CEMP are submitted to the Office of Emergency Management, and the request is then noted on the Record Changes form located in this plan. The Record of Changes form is then updated and distributed to the above departments and agencies for review.

Situation and Assumptions

This section of the Basic Plan includes the following information:

- Hazard Analysis
- Geographic Information
- Demographics
- Economic Profile and Impact
- Support Facilities

The City of Orlando's Geographic Information System (GIS) contains current information and can be assessed before and following an emergency and/or disaster.

Several planning assumptions were made during the development of the City of Orlando Comprehensive Emergency Management Plan (CEMP):

- A major or catastrophic incident will overwhelm the capabilities of the City of Orlando to provide prompt and effective emergency response and short term recovery measures.
- Transportation infrastructure will be damaged, and local transportation services will be disrupted.
- Widespread damage to commercial telecommunications facilities will be experienced, and the ability of first responders, government, and nongovernment agencies to communicate during the response phase will be impaired.

- Homes, public buildings, and other critical facilities and equipment will be destroyed or severely damaged.
- Debris may make streets and highways impassable, limiting the movement of emergency supplies and resources.
- Public utilities will be damaged and either fully or partially inoperable.
- Many victims will be in life-threatening situations requiring immediate rescue and medical care.
- There will be shortages of a wide variety of supplies necessary for emergency survival.
- Hospitals, nursing homes, pharmacies, and other health/medical facilities will be severely damaged or destroyed. Those that do remain in operation may be overwhelmed by the number of victims requiring medical attention.
- Damage to the region's airports could have a significant impact on the region's economic prosperity and on the ability to move supplies and goods in and out of the City and the region.

Hazard Analysis

There are several hazards that are influenced by the City of Orlando's geography, climate, economy and other human-made hazards that may increase the vulnerability, probability and/or potential impact on the City of Orlando.

The result of the hazard identification and vulnerability assessment processes undertaken by the LMS Working Group and the City of Orlando Emergency Management Team were used to create the Hazards Analysis. Table 1 identifies the hazards affecting the City of Orlando, the vulnerability of the hazard, the probability of the hazard, the impact severity of the hazard, and the estimated population at risk. Table 1 provides a snapshot of the information gathered and the judgments made about the various hazards threatening the City of Orlando as a whole, as well as the potential vulnerability to those hazards. Each hazard is explained in more detail throughout the Hazard Analysis.

The State of Florida requires the City of Orlando to include and account for the following ancillary hazards in its Comprehensive Emergency Management Plan (CEMP):

- Radiological-Nuclear Accidents
- Civil-Social Disturbances
- Mass Migration
- Critical Infrastructure Disruptions
- Special Events
- Major Transportation Incidents

These hazards were considered as having minimal impact, were excluded from an in-depth hazard analysis, and are not included or mentioned in the Orange County Local Mitigation Strategy (LMS). They are included in the City of Orlando CEMP as special planning considerations.

The Hazard Summary Annex describes the hazard ranking methodology and summarizes Risk and Vulnerability Assessment as well as Consequence Analysis of each core hazard or hazard of most significance that could potentially impact the public, responders, and continuity of operations including the continued delivery of service, property, facilities, infrastructure, environment, economy and public confidence.

Hazard/Risk Identification and Vulnerability Descriptions

The following section identifies and describes the potential hazards that may affect the City of Orlando and historical events that may provide insight on what might be anticipated in the future. These hazard and sub-hazard identifications were evaluated and analyzed by the Planning Committee for the Orange County Local Mitigation Strategy (LMS). Although the potential hazards that may threaten the City of Orlando are mainly natural hazards, there are a few human-caused or technological hazards that have been profiled as well.

The complete list of the hazards applicable to Orange County can be found in the most recent Orange County Comprehensive Emergency Management Plan (CEMP) and the Orange County Local Mitigation Strategy (LMS). A hazard/risk identification and vulnerability assessment is conducted as a process of defining, identifying, and classifying vulnerabilities and their risks to Orange County and its municipalities, including the City of Orlando.

In the following section, these hazards will be briefly described, along with any sub-hazards. Each hazard will then have a listing of previous occurrences (as applicable), the location of the affected area(s), and the extent of damages. Other factors, such as those measured by the Hazard and Vulnerability Assessment Tool, will be discussed to present the overall risk of each hazard. This includes the probability of future instances, the severity of the hazard (including the magnitude felt by the human impacts, property impacts, spatial impacts, and economic impacts), mitigation measures currently in place to address the hazard(s), the overall vulnerability and exposure, and the relative risk for the hazards.

Table 1: Hazard and Vulnerability Assessment Tool

ORANGE COUNTY LMS HAZARD AND VULNERABILITY ASSESSMENT TOOL									
HAZARD	PROBABILITY	SEVERITY = (MAGNITUDE - MITIGATION)							RISK
		HUMAN IMPACT	PROPERTY IMPACT	ENVIRONMENTAL	PROGRAM OPERATIONS	PREPAREDNESS	TRAINING EXERCISE	LOGISTICS	
	<i>Likelihood this will occur</i>	<i>Possibility of death or injury</i>	<i>Physical losses and damages</i>	<i>Amount of Environment Affected</i>	<i>Interruption of services</i>	<i>Specialized Plans</i>	<i>Multi-year Training and/or Exercise Planning</i>	<i>Equipment, Teams, and/or Support</i>	<i>Relative threat*</i>
SCORE	0 = No threat 1 = 10+ years 2 = 6-10 yrs 3 = 1-5 yrs	0 = None 1 = Low 2 = Moderate 3 = High	0 = None 1 = Low 2 = Moderate 3 = High	0 = None 1 = Up to 25% 2 = 26-50% 3 - 51% or more	0 = None 1 = Low 2 = Moderate 3 = High	0 = Specific Plan 1 = Addressed in other plans 2 = Addressed in one plan 3 = No plans address	0 = Yearly 1 = Every other year 2 = Rarely 3 = None	0 = Highly Specialized 1 = Moderate 2 = Minimal 3 = None	0 - 100%
Diseases and Pandemic	2	1	3	2	3	2	2	1	48%
Animal	2	1	3	2	3	2	2	1	44%
Human	3	2	2	1	3	1	0	0	43%
Plant / Agriculture	2	1	3	2	3	2	3	2	51%
Extreme Temperatures	3	1	1	2	2	2	3	2	54%
Drought	3	0	1	2	3	2	2	2	57%
Freezes / Winter Storms	2	1	1	2	2	2	3	2	41%
Heat Waves	3	1	1	2	1	2	3	3	62%
Floods	3	1	2	2	2	1	1	0	43%
Severe Thunderstorms	3	1	2	1	2	2	3	1	59%
Hail	3	0	2	1	1	2	3	2	52%
Lightning	3	1	2	1	1	2	3	1	52%
Tornados	3	3	3	2	3	1	2	1	71%
Sinkholes / Land-subsidence	3	1	3	1	2	1	3	2	62%
Hazardous Materials	3	2	1	1	2	0	0	0	29%
Terrorism / CBRNE	2	3	3	1	3	0	0	0	32%
Tropical Systems	3	3	3	3	3	1	0	1	67%
Wildfires	3	1	3	1	3	1	1	1	52%

*Threat increases with percentage.

LOW	0%-30%	MEDIUM	31%-60%	HIGH	61%+
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Diseases and Pandemic

Diseases and pandemic outbreaks are caused by several different microbiological organisms such as bacteria, viruses, fungi, parasites, or other pathogens. The City of Orlando does not have a Health Department. However, the City of Orlando does participate with the Orange County Health Department on planning and coordination efforts.

In close proximity to the City of Orlando, Orange County has the 9th largest agricultural industry in Florida. Orange County is the 19th largest producer of Citrus and 32nd largest producer of Beef Cattle. Several diseases can affect the agricultural and livestock sector in Orange County and the State of Florida.

According to the Orange County Health Department, there are a variety of diseases that can affect animals, humans, and plants/agriculture in Orange County. For the most part, these diseases have been mild in nature with minimal impacts or widespread casualties in Orange County and the City of Orlando. The Orange County Health Department controls the majority of diseases or pandemic outbreaks, and most of the trends we see are reported by physicians, hospitals, laboratories, or other medical providers and community partners.

Several diseases present an annual threat to the City of Orlando. Societal, environmental and technological factors impact the occurrence and persistence of diseases worldwide, as new diseases emerge or new vulnerabilities present themselves each year. Old diseases may even reappear or develop drug-resistant strains in animals or humans, such as malaria, tuberculosis, or bacterial types of pneumonia. Many diseases can be carried by infected people, animals, and/or insects. There are even those that can contaminate local agriculture and impact the crop harvest.

The Diseases and Pandemic hazard consists of three sub-hazards, including animal, human, and plant/agriculture. These sub-hazards are described in further detail below.

a. Animal

The City of Orlando does not have an Animal Services Department. However, the city does participate with Orange County on planning and coordination efforts and keeps abreast of developing situations in this area. Several diseases can be transmitted amongst Orange County's animal population, both for pets as well as livestock. Examples of these are hoof and mouth (FMD) and mad cow disease.

Hoof and mouth disease is a severe plague for animal farming since it is highly infectious and can be spread by infected animals through aerosols, through contact with contaminated farming equipment, vehicles, clothing or feed, and by domestic and wild predators.

Mad cow disease is a fatal neurodegenerative disease (bovine spongiform encephalopathy or BSE) in cattle that causes a spongy degeneration in the brain and spinal cord. BSE has a long incubation period, about 30 months to 8 years, usually affecting adult cattle at a peak age onset of four to five years, all breeds being equally susceptible. The disease may be easily transmitted to human beings by eating food contaminated with the brain, spinal cord or digestive tract of infected carcasses. Although the infectious agent is most highly concentrated in nervous tissue, it can be found in virtually all tissues throughout the body, including the blood.

The State of Florida's Department of Agriculture and Consumer Services, Division of Animal Industry oversees the reporting of the following diseases:

- Avian Influenza
- Hoof and Mouth
- Rabies
- Swine Influenza

There have been isolated reports of these animal diseases, but none to the degree to cause significant impacts or losses in Orange County. However, there is still a chance that these diseases or others could create considerable implications in the future.

b. Human

Due to the massive influx of visitor populations (tourists and seasonal residents) that come to the City of Orlando and Orange County, there is a higher chance for exposure to many types of human diseases from all over the country or even the world. Human diseases can be caused by a range of different pathogens, each with their varying degrees of infection, symptoms, and lethality. Pandemic outbreaks of diseases have always been a continuing risk for the City of Orlando, Orange County, and the State of Florida. A pandemic refers to the global spread of a disease, while an epidemic is localized to a geographic region. The most likely pandemic will occur when there is a worldwide spread of a new strain of influenza for which there is little or no immunity for humans. This new virus then begins to cause serious illness, spreads quickly from

person-to-person worldwide, and has the potential to kill people regardless of age or health status.

Many different influenza viruses can cause illnesses that can reach epidemic or pandemic levels. In the 2000s, two strains of flu, seasonal flu (common influenza), and the H1N1 (Swine) flu were circulating in the United States, while a third, highly lethal H5N1 (Avian) flu was being closely tracked overseas. Most healthy people recover from common influenza without problems, but certain people, such as children, elderly, or individuals with compromised immune systems, are at a higher risk of severe complications.

Orange County has intermittently experienced some significant occurrences of diseases over the years, such as various influenza strains like H1N1 in 2009, Norovirus in 2010 and 2012, and West Nile virus in 2014. During 2013-2014, Orange County also experienced a handful of cases of Middle East Respiratory Syndrome (MERS) from international travelers. Most of these cases were isolated instances with relatively minor impacts on those affected.

Also during the past decade, several diseases that are not naturally occurring in Florida, such as malaria, Dengue fever, and Chikungunya fever, were introduced into Orange County. Instances of these imported diseases were relatively few in number and did not typically spread among the wider population.

In 2015-2016, the Zika virus, a mosquito-borne virus, made an appearance primarily through travel-related cases around the country with several hundred people in Orange County being infected. Even though its lethality is extremely low, there have been cases of pregnant women whose children have developed microcephaly and other severe fetal brain defects. In recent years, global monitoring for the Ebola virus and preparedness efforts were significantly heightened due to its outbreak in West African countries, but, as of yet, no incidences have been reported in Florida.

Many other diseases, such as tuberculosis and common influenza, regularly occur each year or along a seasonal cycle, affecting a significant number of people. Tuberculosis has seen a higher than average rate of occurrence, especially in the transient and farmworker populations. Tuberculosis cases numbered 63 in 2016 and 55 in 2017 in Orange County. Influenza cases are also typically higher in Orange County than other surrounding counties due to the higher population, more dense/urban locations, and access to monitoring and reporting from healthcare agencies, like hospitals and urgent care facilities.

Some of the human diseases that have been diagnosed in Orange County are listed below. This is, however, by no means a comprehensive list of possible diseases that exist or may come to exist in the future.

- Botulism
- Dengue Fever
- E. Coli
- Hepatitis A, B, and C
- Influenza strains
- Meningitis (Bacterial & Mycotic)
- Salmonellosis
- Tuberculosis
- West Nile Virus
- Zika Virus

Public health systems in Orange County and support from other health and medical providers help to create an extensive network for monitoring infection trends. It is typically the case with emerging infectious diseases that it is tough to predict where, when, and how many people may be affected by them, or how long their effects may last. A rapid spread of these diseases would result in significant numbers of people being affected and all of the municipalities in Orange County, including the City of Orlando, are considered vulnerable to a disease outbreak.

Human diseases, especially when they reach an epidemic or pandemic phase, can result in thousands or even millions of people ill or dying and billions of dollars in lost revenue. This hazard could also disrupt government services and businesses, as well as cause significant disruptions in our critical infrastructure (electrical, telecommunication, roadways, water, wastewater, etc.) through the absence of the individuals who maintain these systems and operations. These disruptions can potentially include the entirety of the City of Orlando, and such illnesses can have an impact on the individuals who run the services and systems of city-wide infrastructure, businesses, and government services.

c. Plant/Agriculture

Florida is among the top three agriculture-producing states in the nation with Orange County listed as the 10th highest grossing county for the value of agricultural products in 2012 at \$262 million. These industries are susceptible to many hazards including freezes, droughts, and exotic pests or diseases. Crops are grown predominantly in the

rural areas of the county, including the eastern and northwestern portions of the county.

Most crops are vulnerable to the effects of some disease or pest/infestation. As a result, much like the rest of Florida, growers in Orange County use large volumes of pesticides to help promote healthy crops. Silviculture and agriculture, especially citrus production, plays a role in the Orange County economy. The main threats to the Orange County agriculture industry are:

- Citrus Canker
- Fungal diseases
- Huanglongbing (or Citrus Greening)

There has not been a large-scale epidemic or pandemic of animal, human, or plant/agriculture diseases in Orange County. They have stayed relatively isolated or on a small scale. Nevertheless, the City of Orlando and Orange County may be susceptible to diseases and pandemic, whether animal, human, or plant/agriculture. Centrally developed urban areas within the City of Orlando and its neighboring municipalities would be more likely to transmit human diseases or contain outbreaks whereas the more rural areas of Orange County would be able to sustain the impacts from livestock/animal diseases. Plant or agricultural diseases would be found on or near farmlands and other agrarian properties outside the City of Orlando in Orange County.

The City of Orlando's growing visitor population, seasonal residents, transportation network, and international travelers may also play a role in increasing the likelihood of infection. Our growing resident population may also increase the extent that most areas of the city could become exposed to disease as it can travel more quickly and creates difficulty in preventing the spread of infection. Expectations are that Orange County would first experience an epidemic with smaller-scale outbreaks; every attempt would be made by the public health system in place to address this type of incident. If the public health system were to become overwhelmed, or if the rate of spread were to reach a tipping point, a pandemic level could be reached in a worst-case scenario.

There is a high probability that Orange County will experience some form of disease every 1-5 years and, depending on the different types of pathogens; there may be multiple diseases that can impact Orange County at numerous points throughout the year. While many of the diseases are cyclical in nature with a high rate of occurrence, most will not reach the epidemic or pandemic state. Historically, influenza pandemics have occurred every 11-39 years. It has been more than 30 years since the last

pandemic. Many experts consider influenza pandemic to be inevitable, yet no one knows when the next one will occur; this is the scenario public health agencies in Orange County are preparing to focus on for their prevention activities.

There have been injuries associated with diseases in Orange County where people or animals have been hospitalized or, in some cases, have resulted in death. While there have not been large scale pandemic outbreaks to cause large scale deaths, some pathogens have the potential to be lethal, especially among vulnerable populations like children, the elderly, transient people, and/or others.

Economic impacts or interruption of service may be associated with disease and pandemic outbreak. There may also be some law enforcement/security issues if a large-scale pandemic were to occur. Infectious disease control would also impact social services, mass care, and healthcare systems. Financial losses may be seen in terms of lost revenue to individuals due to sickness or impact supply chains, worker populations, and/or tourism dollars.

If a pandemic outbreak were to occur, Orange County's Health Services (ESF-8) is the lead agency that the City of Orlando would coordinate with in responding to such a scenario. On a day-by-day basis, they conduct mitigation measures that include epidemiological surveillance, public outreach, and distribute medicine for treatment. They also track the trends of possible outbreaks throughout the county while monitoring the state, country, and world for potential issues. They also maintain plans to address mainly human diseases and conduct annual exercises and periodic training. There are also more specialized teams that are equipped to deal with human diseases. Animal and plant/agriculture diseases do not tend to have as many preventative measures.

Any place where living creatures gather has the potential to be vulnerable to diseases and pandemics. While the City of Orlando consists of several urban areas where populations are densely concentrated, other vulnerable areas may present themselves at area theme parks where visitors or seasonal residents from around the world are present. This may allow human diseases to be more easily transmissible, especially in vulnerable populations like children and the elderly.

On the positive side, there are several local area hospitals, medical clinics, and other healthcare providers that monitor for potential epidemiology and infectious disease. Systems are in place to provide medicines and other mass prophylaxis through Points of Dispensing (PODs) in case of epidemic or pandemic, and additional support can be

brought in through other state agencies. This helps to decrease the vulnerability of the City of Orlando and other municipalities in Orange County.

Meanwhile, less densely populated municipalities in Orange County or rural areas of the unincorporated county that are used for agriculture, silviculture, or raising livestock are more susceptible to animal and plant diseases. Animal and plant diseases can result in thousands or millions of dollars in lost revenue to the agriculture industry in Orange County. The county-wide impact of plant and animal diseases is ranked as low. While this hazard may affect a small fraction of local food supplies, the vast majority comes from outside of Orange County.

There are monitoring systems in place around Orange County, such as sentinel chickens, that are used to detect the presence of certain pathogens, like Dengue fever or West Nile virus that are spread by mosquitos. Other state agencies are also on hand to help provide additional support, supplies, or equipment to identify, assess, or treat diseases found in animal or plant/crops that reduce the vulnerability of Orange County and its municipalities.

Several different vulnerable populations are especially susceptible to diseases and pandemic outbreaks. Farm workers could potentially impact the spread of plant or agriculture diseases without realizing they are carrying mold, bacteria, or viral agents on their clothing or footwear. Those workers that come into contact with a diseased animal may potentially help spread pathogens to other animal populations as well. Children, elderly, inmates, and transient people may be the most vulnerable to human diseases, as well as those with special needs whose immune systems may be compromised. Seasonal visitors may also be susceptible to human diseases as they may come into contact with large numbers of people from all over the world.

Risk: Medium – 48% overall; Animal – 44%, Human – 43%, and Plant/Agriculture – 51%. As previously stated, the most likely pandemic that the City of Orlando and Orange County would face would be from a strain of Influenza. This type of pandemic would occur when a new influenza virus emerges for which there is little or no immunity for humans. This new virus could then begin to cause serious illness and spread easily from person-to-person. There have not been any significant human diseases or epidemics within Florida in the last five years making the probability low. However, Orange County has occasionally experienced small-scale health-related incidents such as a heightened threat from the H1N1 Influenza virus in 2009.

When diseases reach an epidemic or pandemic level, thousands of people can become ill or die as a result. Property impacts for animals and plants/crops could reach

into the millions of dollars in damages as well. This hazard could also disrupt government services and businesses due to sickness or quarantine efforts of individuals/employees, as well as cause significant disruption in our critical infrastructure (electrical, telecommunication, roadways, water, wastewater, etc.) through the absence of the individuals who maintain these systems and operations. These disruptions would generally be isolated, but could potentially include the multiple portions around Orange County thereby making the impact of diseases felt countywide.

Extreme Temperatures

The City of Orlando can experience natural temperature changes throughout the year. Generally, these temperatures are characteristic of a tropical climate, and there are two main climatic seasons each year. The first is warm with reasonable amounts of rainfall that lasts from May until late September. The second is drier and relatively cooler, from late October through April, which has less rainfall. The warm and humid climate is due to a low, flat elevation near the center of the Florida peninsula.

The occurrence of extreme temperatures is frequent in the City of Orlando and the region because the geography of Florida is situated on the southern fringe of the humid subtropical climate zone. Extreme heat and freezing temperatures, when they do occur, take place in the summer and winter months and are usually anticipated. Such extreme temperatures affect citizens and crops across the jurisdiction.

Several types of sub-hazards are associated with extreme temperatures in the City of Orlando: drought, freezes/winter storms, and heat waves. Each of these hazards has its own list of previous occurrences, affected locations, the extent of damages, the probability of future incidents, impacts, vulnerabilities, and overall risks. As such, these sub-hazards will each be described and evaluated separately.

a. Drought

Drought is a persistent and abnormal moisture deficiency resulting in a water shortage that can have adverse impacts on vegetation, animals, or people. There are generally three types of droughts:

- Meteorological drought is usually based on long-term precipitation departures from what is considered ‘normal’, though high temperatures often play a role.
- Hydrological drought refers to deficiencies in surface and subsurface water supplies.
- Agricultural drought occurs when there is not enough soil moisture to meet the needs of a particular crop at a particular time.

Droughts can affect parts or most of the City of Orlando, as a result of reduced rainfall or standing water which can affect fire conditions and/or public water consumption in the most catastrophic of scenarios. Residential communities in the City of Orlando may be impacted by the hazard of a long term or severe drought as water sources could dry up and make them less desirable to live in.

Droughts have affected Orange County several times during the last few decades, including the early 1970s, the early 1980s, 1989-90, 1998-01, and 2007. Between November 1999 and May 2001, the water levels in Lake Okeechobee dropped to the lowest recorded levels. More recently, the United States Department of Agriculture (USDA) made a drought declaration for Orange County as a primary county in 2012 and a contiguous county in 2013.

Table 2: Orange County Drought Occurrences, 2001-2018

Drought Period Start	Drought Period End	Number of Months	Peak Drought Severity Category
February 2000	September 2001	17	D4
October 2001	June 2002	8	D1
June 2004	June 2004	1	D1
March 2006	July 2006	4	D2
August 2006	September 2006	2	D1
October 2006	April 2008	18	D2
May 2008	July 2008	2	D1
January 2009	June 2009	6	D4
July 2010	October 2011	15	D4
December 2011	June 2012	7	D4
January 2013	June 2013	6	D2
November 2013	February 2014	4	D1
March 2017	June 2017	4	D3
March 2018	May 2018	3	D1
November 2018	December 2018	2	D1

Source: U.S. Drought Monitor, Tabular Data Archive, Categorical Statistic Type

When drought begins, the agricultural sector is usually the first to be impacted because of its heavy dependence on stored soil water. Those who rely on surface water (i.e., reservoirs and lakes) and subsurface water (i.e., groundwater), for example, are usually the last to be affected. A short-term drought that persists for three to six months may have little impact on these sectors, depending on the characteristics of the hydrologic system and water use requirements.

Table 3: U.S. Drought Monitor Classifications

Abnormally Dry (D0)	<p>Going into drought</p> <ul style="list-style-type: none"> • Short-term dryness slowing planting and growth of crops or pastures • Above average fire risk <p>Coming out of drought</p> <ul style="list-style-type: none"> • Some lingering water deficits • Pastures or crops not fully recovered
Moderate Drought (D1)	<ul style="list-style-type: none"> • Some damage to crops and pastures • High fire risk • Streams, reservoirs, or wells low: some water shortages developing or imminent and voluntary water use restrictions requested
Severe Drought (D2)	<ul style="list-style-type: none"> • Crop or pasture losses likely • Very high fire risk • Water shortages common: water restrictions imposed
Extreme Drought (D3)	<ul style="list-style-type: none"> • Major crop/pasture losses • Extreme fire danger • Widespread water shortages or restrictions
Exceptional Drought (D4)	<ul style="list-style-type: none"> • Exceptional and widespread crop/pasture losses • Exceptional fire risk • Shortages of water in reservoirs, streams, and wells, creating water emergencies.

Source: NOAA

Extent: In order to have a constant measuring tool when defining drought, climatologists use the categorical U.S. Drought Monitor statistic (i.e., the percent of the area in a specific drought category) to classify levels of drought. These range from "D0" to "D4," with a comprehensive list of impacts corresponding to the severity of the

drought (refer to Table 3). D1 is the least intense level and D4 the most intense. Drought is defined as a moisture deficit bad enough to have social, environmental or economic effects. D0 areas are not in a drought but are experiencing abnormally dry conditions that could turn into drought or are recovering from drought but are not yet back to normal. The U.S. Drought Monitor uses these labels to denote general drought areas by the intensity of the impacts being felt at that time based upon soil moisture deficits.

Probability: The likelihood of drought returning to the City of Orlando and Orange County is high as it is likely for an occurrence, in some form, to be nearly annual. However, the severity for each incident is variable and can range anywhere from a D1 (moderate drought) to D4 (exceptional drought). A lower severity is more likely to occur and generally precedes the higher severity for many weeks before more significant impacts are felt. Drought conditions have generally improved since the last peak drought period in spring of 2017. Weather outlooks extend only so far, but as new data is gathered and interpreted, these predictions can change.

Impacts: Drought is usually associated with long periods of intense heat and/or small amounts of precipitation. Drought often does not directly affect humans, but extreme heat associated with a drought period can cause injury and even death, particularly among our vulnerable populations, such as children, elderly citizens, transient people, and/or other special needs populations. Injuries and potential deaths are most likely to impact rural or economically disadvantaged areas that lack air conditioning and immediate medical care. The most substantial impact for periods of prolonged drought is the financial impact on the agriculture industry for crops or livestock. Severe drought would likely damage or possibly destroy crops before harvest or limit the number of livestock that could be reared. Exceptional droughts would devastate much of the agricultural and ornamental plants sector for the City of Orlando and Orange County.

According to the Small Business Administration (SBA), there has not been a disaster loan issued for drought from 2008 to 2015. This does not eliminate the fact that drought has potentially affected agricultural businesses over the past several years, only that there has not been a declared disaster by the SBA related to drought.

While drought may not have a measurable effect on residences, public facilities, or critical infrastructure, other consequences could be felt. Impacts to water supplies or water utilities would likely be the worst-case scenario for a period of severe to exceptional drought. Extended periods of drought over several months, or even years, could have long-term environmental impacts on the area, including species endangerment, changes to the local agricultural makeup, and produce prices. Much of

the citrus industry in Orange County has seen losses in production due to drought over the past several years. There is also an increased risk for sinkhole formation after a long period of drought conditions is followed by a downpour in precipitation. Flooding is another potential hazard associated with drought as the dry ground cannot absorb the sudden amount of moisture. Wildfires may also be more likely to occur during drought conditions as the soil moisture can impact vegetative growth, which provides a fuel source for the fire.

Mitigation Measures: As a result of recurring droughts, the St. Johns River Water Management District (SJRWMD) and the South Florida Water Management District (SFWMD) have imposed watering restrictions for landscaping irrigation in Florida to improve the efficient use of water resources that can become scarce during drought periods. Limiting the number of days per week and the time of day watering occurs has helped to reduce drought impacts and conserve our water resources for some of the most necessary places. Orange County has adopted ordinances for water use and drought-resistant landscaping to help reduce watering needs during drought.

Drought generally has not made its way into many of the City of Orlando or Orange County's preparedness plans, but it is addressed in the City of Orlando's Comprehensive Emergency Management Plan (CEMP). Very little training and exercise are conducted in relation to drought due to its slow-moving, long-term nature. Concerted efforts by the water management districts and land-use or growth management groups to help prevent the impacts from drought are where most of the mitigation efforts are focused, but very little logistical support is dedicated to drought mitigation or relief.

Vulnerability: The City of Orlando is vulnerable to drought due to how widespread its impacts can be felt across the entirety of Orange County. The City of Orlando has a moderate amount of acreage designated for conservation, public lands and agricultural land uses. When this acreage becomes parched during a drought, the area becomes vulnerable to wildfires. While the impacts themselves have not directly resulted in a loss of life or many casualties, the absence of soil moisture that indicates drought is mainly determined by local weather patterns and how much rain falls. This hazard can be somewhat unpredictable as to when it occurs, or at least how severe it will be, and that in part makes the City of Orlando vulnerable to it. The City of Orlando has experienced only minimal impacts on property with very little directly caused by drought. However, there have been economic impacts experienced by Orange County in the past to agriculture, crops, and plants that have brought about moderate losses to the county.

Populations that are directly vulnerable to drought are limited but may include those groups whose employment is directly tied to soil moisture, such as farm workers. Associated hazards, such as heat waves, sinkholes, wildfires, and even flooding may be exacerbated due to drought conditions in the City of Orlando and Orange County. Other populations may be affected by these resulting or associated hazards, such as the transient population that is looking for refuge from the conditions caused by drought. Tourists, visitors, and seasonal residents may also be discouraged to visit or relocate to the City of Orlando due to these associated hazards.

The natural environment of the City of Orlando is also vulnerable to the effects of drought as smaller water bodies can dry up or recede, and further impacts to neighborhoods, homes, and other communities may experience the secondary hazards associated with droughts such as wildfire, sinkholes, and heat wave. Periods of drought may also worsen flood conditions if and when a substantial amount of rain arrives. Stormwater/runoff may increase as the ground has hardened and is unable to absorb the moisture quickly enough. This can cause ponding or flooding in areas that might not usually be susceptible to flooding.

During periods of prolonged drought, the lowering of the groundwater table typically results in decreased soil moisture to greater depths. In response to the drier conditions, soils contract to a greater extent, and to a greater depth, than during a normal rainfall season. When these soils are supporting a foundation, they can shrink away to the point that the foundation is left unsupported. Even deep foundations such as caissons or driven piles can be affected as they rely on 'skin friction', i.e., the friction created at the contact between the soil and concrete, wood, etc. When soils become desiccated due to low moisture, they contract away from the caisson or driven pile, compromising the frictional bond. Damage to buildings due to soil desiccation is expressed most commonly as cracks in the structure, sloping floors, and difficulty opening doors or windows.

Besides buildings, retaining walls, bridges, sidewalks, and pavement are also vulnerable to damage from expansive soils. Although asphalt concrete pavement is more flexible than rigid concrete and therefore more able to tolerate soil movement, it is still subject to stresses imposed by expansive soils. During periods of drought, cracks upwards of three feet deep can develop due to desiccation of expansive soils. Warping and cracking of pavement have resulted in billions of dollars' worth of damage to highways and streets. Expansive soils are such a concern at airport taxiways and runways that methods of soil stabilization are being developed to counter their effects. Other related conditions may affect water lines or damage the ground near power lines or gas pipelines that could create a utility outage. These conditions would require long

periods of drought and are an extreme instance, but could potentially occur in the City of Orlando.

Risk: Medium – 57% Due to the high rate of return for drought and the anticipated severity, but with few mitigation measures currently in place, this hazard is scored as a Medium relative risk. Also, drought has great potential to be a long-term hazard and can persist for many months or even years with little to no abatement. Existing policies, legislation, and action by water management districts and land-use/growth management have helped to curb the impacts in the City of Orlando and Orange County. For the most part, the hazard on its own does not impact residents or visitors to the City of Orlando; it is the associated hazards that can create the most disruption.

b. Freezes/Winter Storms

A winter storm can range from a few hours of moderate snow to blizzard-like conditions with wind-driven snow that can last for days. Winter storms can impede visibility, affect driving conditions, and can have an impact on communications, electricity, or other critical services. The City of Orlando is not generally susceptible to winter storms, because temperatures rarely reach snow producing levels. This does not, however, mean that snow and winter weather is unheard of, but it is a rare occurrence. The climatic conditions for long-lasting winter storms are also not favorable.

Nevertheless, temperatures can reach freezing levels that are low enough to cause damage to crops and water lines/pipes. Freezing occurs when temperatures are below freezing (32°F) over a widespread area for a significant period. Freezing temperatures can damage crops and burst water pipes in homes and other buildings. Frost, often associated with freezes can increase damaging effects. Frost is a layer of ice crystals that are produced by the deposit of water from the air onto a surface that is at, or below, the freezing point. A freeze warning is issued to make the public and agricultural interests aware of anticipated freezing conditions over a large area. Similarly, a hard freeze is issued under the same conditions as a freeze warning, but the temperatures may stay well below 28°F for the duration of four hours or more.

During the winter season, humidity is normally lower and temperatures are more moderate, but this can easily change back and forth from high to low. Temperatures can dip below the freezing mark on an average of 2.4 nights per year. The lowest recorded temperature was 18°F, which was set on December 28, 1894. These low temperatures caused considerable damage to the burgeoning citrus industry in Orange County and are known as the “Great Freeze of 1894-1895.”

Because the winter season is dry and freezing temperatures usually occur only after cold fronts have passed, snowfall is exceptionally rare in the City of Orlando. The only accumulation ever to occur in Orange County, at least since written records began, was in 1948. It is also quite possible that accumulations occurred in connection with the Great Blizzard of 1899. Flurries, ice, and other winter weather have also been sporadically observed in 1989 and 2006. More recently, a handful of freezes were recorded in 2003, 2009, and 2010, some of which caused damage mainly to the citrus crops. These events are recorded in Table 4 with data comprised from the National Weather Service (NWS) and the Spatial Hazard Events and Losses Database for the United States (SHELDUS™).

The City of Orlando and Orange County have not experienced any significant freezes or winter storms since 2010. A freeze warning was issued for some parts of Central Florida for February 20, 2015; Orange County received a wind-chill advisory. Winter temperatures since 2011 have approached freezing on a few occasions, but either did not dip below the temperature thresholds or for a long enough time to be considered a freeze. In densely populated urban areas such as the City of Orlando, the impacts of freezes or winter storms can be higher for vulnerable populations (e.g., elderly and transient).

Extent: The extent of damages for freezes and winter storms is based on the temperature and the length of time that temperature stays below freezing. The City of Orlando has experienced mostly moderate freezes. The worst case scenario would be a severe, or 'hard', freeze where the temperature stays well below 28°F for four or more hours, but these are few in number. When they do occur, they can cause significant damages to agriculture, especially to the citrus industry. In 2010, the freeze damaged between 6% and 10% of the orange and grapefruit crop. The City of Orlando can expect much the same for any future freeze and winter storm incidents with moderate freezes being the majority of occurrences with only a handful of hard freezes. Winter storms will be minor in their severity due to their infrequency with only small amounts of property damage to be expected.

Probability: A review of SHELDUS™ data indicates that the likelihood and probability of future occurrences of freezes and/or winter storms in Orange County will be about once every five (5) years. While the potential for moderate freezes may be expected every one to two years, severe freezes, which cause the highest crop losses, may be expected on average once about every 10+ years.

Impacts: The City of Orlando has not experienced high amounts of human impacts directly due to freezes or winter storms. Property damage to residences or other

buildings has also been low with only minor physical losses. These are caused mainly by burst water pipes or outdoor faucets that are not insulated. The entire City of Orlando can feel the spatial impacts during a freeze or winter storm, but typically when it occurs, the impacted areas are isolated. In terms of economic impacts, crops like citrus, ornamental plants, and livestock may also be at risk from a freeze of a winter storm. In Table 4, the estimated and adjusted crop damages from winter weather and frost/freezes that have occurred in Orange County are listed from the past several decades. According to SHELDUS™, the total Adjusted Crop Damages (2013 dollars) for Orange County is estimated to be \$7.5 million since 1968. The most recent record frost/freeze occurrence happening in late 2010 and was estimated to have caused \$1.185 million in damages (adjusted value). Many times, there is a good deal of notice before most of these frost/freeze incidents, so that most areas can prepare for the storm. In some cases, though, the temperature may drop more rapidly or hold for longer than anticipated.

Table 4: Historical Winter Weather in Orange County

Start Date	End Date	Winter Weather Type	Estimated Crop Damages	Adjusted Crop Damage (2013)
03/23/1968	03/25/1968	Winter Weather*	\$3,676	\$24,611
01/10/1977	01/21/1977	Winter Weather*	\$746,269	\$2,868,787
01/21/1985	01/23/1985	Winter Weather*	\$74,627	\$161,569
02/23/1989	02/23/1989	Winter Weather*	\$1,136,360	\$2,134,863
12/22/1989	12/25/1989	Winter Weather*	\$746,269	\$1,402,005
01/24/2003	01/24/2003	Winter Weather*	\$10,000	\$12,661
01/21/2009		Frost/Freeze	\$0	\$0
01/02/2010	01/13/2010	Frost/Freeze*	\$840,000	\$897,402
12/14/2010		Frost/Freeze	\$0	\$0
12/27/2010	12/29/2010	Frost/Freeze*	\$1,110,000	\$1,185,853
Total Estimated Damages			\$4,667,201	\$7,501,898

*Note: Information obtained from SHELDUS™

Source: NWS and SHELDUS™

Mitigation Measures: In general, there are relatively few mitigation measures enacted by the City of Orlando with regard to freezes or winter storms due to their infrequency. Freezes and cold weather are identified as a hazard and are addressed by the City of Orlando CEMP. There are no training or exercises conducted in regards to this hazard

in at least the past decade. There is very little equipment, teams, or other logistical support to address this hazard.

Vulnerability: The City of Orlando is vulnerable to freezes and winter storms due to how widespread its impacts can be felt across the entire jurisdiction. As stated before, the occurrence of the hazard is infrequent with few impacts to life safety and property. While the impacts themselves have not directly resulted in a loss of life or many casualties, the results are mainly determined by weather patterns. This hazard can be somewhat unpredictable as to when it occurs, or at least how severe it will be, and that in part makes us vulnerable to it. The City of Orlando has experienced only minimal impacts on property with very little directly caused by freezes and winter storms. However, there have been economic impacts experienced in the past to agriculture and plants that have brought about moderate losses to Orange County. Transient populations would be vulnerable during a freeze or winter storms and would need to seek an overnight shelter. Farm workers may be economically impacted if crops suffered from freeze conditions.

Risk: Medium – 41% Due to the moderate rate of return for freezes and winter storms, the anticipated severity, but with few mitigation measures currently in place, this hazard is scored as a Medium relative risk. Freezes have some potential to persist for a few hours to even a couple of days; winter storms could last longer if conditions were favorable, but historically they have only lasted up to a few of days. For the most part, this hazard does not significantly impact residents or visitors to the City of Orlando and only has mild property damages; the impacts are felt mainly by the agriculture industry in rural parts of Orange County.

c. Heat Waves

The middle of the summer season in the City of Orlando is quite humid with high temperatures usually in the lower to mid-90s°F, while low temperatures rarely fall below 70°F. The humidity can act as a buffer and typically prevents actual temperatures from exceeding 100°F. However, the heat index can climb to over 110°F (43°C). During the summer months, strong thunderstorms occur in the afternoon almost daily, which can help to cool the temperature slightly. A heat wave, which is different from drought, is when temperatures are abnormally and uncomfortably hot for an extended period. This event could continue from one day to several weeks. Heat waves are often accompanied by high humidity and can have a significant impact on lives, including heat strokes, heat exhaustion, and even death. Heat kills by pushing the human body beyond its limits. In a humid environment such as the one in the City

of Orlando, which is susceptible to heat wave conditions, evaporation is slowed, and the body must work harder to maintain a normal temperature.

The City of Orlando has experienced 9 days of record temperatures over 100°F since 1892 (refer to Table 5). While individual days of record temperatures may not equal a heat wave, these record days are usually flanked by multiple days of high temperatures. According to SHELDUS™, two dates were recorded as hazard instances for heat: on 07/03/1997 with one recorded death; and 06/01/1998. No property damages or crop damages were reported as a direct result of either of these occurrences.

Residents of and visitors to the City of Orlando may be more susceptible to the effects of a heat wave due to the Heat Island effect. This occurs where developed urban areas are hotter than nearby rural areas. Heat islands can affect communities by increasing summertime peak energy demands and air conditioning costs, as well as other environmental aspects such as air pollution, greenhouse gas emissions, and water quality. There can also be a higher propensity for heat-related illnesses and mortality.

Extent: Much as with other climate-related hazards, the temperature is the best scale for this hazard. The Heat Index Chart in Figure A provided by the NWS shows that caution should be used at temperatures starting at 80°F. The NWS issues an advisory when the heat index is anticipated to exceed 105°F-110°F for at least two consecutive days. With increased temperatures and humidity come increased health effects from prolonged exposure and/or physical activity. Various disorders can range from mild cases of sunburn to more severe symptoms like heat cramps, heat exhaustion, and heat stroke. The City of Orlando regularly experiences air temperatures well over 80°F. For a period of about five months each year, from May to September, the average high temperature hovers at or above 90°F with high humidity. The heat index regularly climbs over 100°F during these months as well, but it is rarely sustained for more than a few days. The record temperature experienced in the City of Orlando reached its maximum at 103°F; we could reasonably expect a temperature similar to this high point to occur again in the future. The City of Orlando expects that heat waves will continue to occur mainly in these summer months.

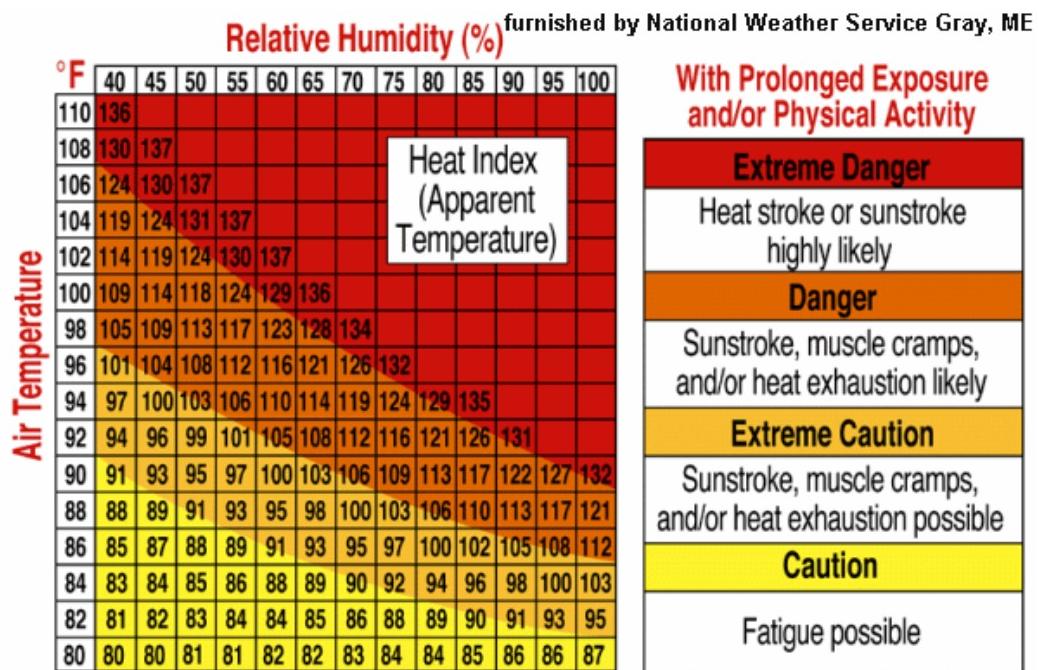
Probability: The likelihood of long periods of high temperatures and heat waves returning to the City of Orlando is high as it is likely for an occurrence, in some form, to be nearly annual. The severity of each incident is variable. High temperatures normally occur in the summer months and may peak for many days during a heat wave. Weather outlooks extend only so far, but as new data is gathered and interpreted, these predictions can change.

Table 5: Record Temperature Extremes, 1892 – 2018

Date	Record Temperature
08/18/1916	101°F
08/16/1918	101°F
06/18/1921	101°F
08/01/1922	101°F
06/06/1927	101°F
07/28/1936	101°F
07/02/1998	101°F
05/31/1945	102°F
09/08/1921	103°F

Source: ThreadEx Long-Term Station Extremes for America <http://threadex.rcc-acis.org/>

Figure A: Heat Index Chart



the elderly, transient populations, or other individuals with special needs that are vulnerable to high temperatures. Visitors to the City of Orlando who are not acclimated to higher temperatures and humidity may also be at risk to the various heat disorders. There have not been any reported cases of property damage to buildings or infrastructure at this time. This does not mean that there have not been any damages. If there were any, these would have been relatively minor. The entire jurisdiction may be geographically impacted. The City of Orlando's warm climate attracts many visitors and part-time residents throughout the year, but most visitors may not be deterred by a heat wave. Due to increased usage for water utilities or electricity for air conditioning, there may be temporary power outages, called brownouts that could impact the jurisdiction. Overall, the impacts from heat wave are minor.

Mitigation Measures: In general, there are relatively few mitigation measures enacted by the City of Orlando with regard to heat waves. Heat waves and other extreme temperatures are identified as a hazard and are addressed by the City of Orlando CEMP. There are no training or exercises conducted in regards to this hazard in at least the past decade. There is no equipment, teams, or other logistical support to address this hazard.

Vulnerability: The City of Orlando may be considered especially vulnerable to a heat wave as urban development has typically replaced open lands and vegetation that help retain moisture in buildings, roads, pavement, and other impermeable surfaces that stay dry. Parks, open land, and water bodies within the city help reduce temperatures in isolated areas. High temperatures are a near guarantee with heat waves returning likely as well. Their impacts have been historically low in the City of Orlando for human, property, and economic damages and losses. With very few mitigation measures currently in place those, this increases the vulnerability to this hazard.

Risk: Medium – 41% Due to the moderate rate of return for heat waves, the lower anticipated severity, but with few mitigation measures currently in place, this hazard is scored as a Medium relative risk.

Floods

A flood or flooding refers to the general or temporary conditions of partial or complete inundation of normally dry land areas from the overflow of inland or tidal water and surface water runoff from any source. Water can collect in areas called floodplains, which are defined as any land areas susceptible to being inundated by water from any flooding source.

In the City of Orlando, that flood source is typically rain that exceeds the carrying capacity of its drainage systems. Tropical systems like tropical depressions, tropical storms, or hurricanes can also bring with them large amounts of falling water to the area, which subsequently results in flooding. The average annual rainfall in Orlando is 50.6 inches (1,290 mm), the majority of which occurs in the period from June to September. Rain ranks third in the order of a hurricane's destructive force. During the average 24-hour period that it usually takes a hurricane to pass over an area, the average rainfall could be between 5 and 10 inches. However, in Florida, there have been hurricane-related rainfalls ranging from 12 to 20 inches. These excessive rains that accompany hurricanes can cause excessive flooding in low lying areas. This results in riverbank overflow or ponding on the roads near a drainage runoff area. The subsequent inability of a water body to accommodate the added runoff contributes to or causes the flooding. Ponding occurs in low areas that are characterized by either poorly drained or supersaturated soils (i.e., high water table). This type of flooding is prevalent in areas where the drainage basins are located.

Other bodies of water like rivers, lakes, streams, wetlands, or even overburdened stormwater systems, can also cause flooding through rising waters where water systems collect. Low lying areas and/or poorly drained land can also accumulate rainfall through ponding on the surface. Floodplains help to store water for eventual release after the end of the storm. In many communities, flooding can cause severe impacts and justifies the importance of carrying flood insurance.

Multiple aggravators can cause floods to be more intense, more frequent, and to have a significant effect on humans:

- Where humans choose to live
- Living in flood plains (natural areas that rivers expand into during rainfall) – homes and infrastructure is more likely to be affected by floods every time it rains
- Living in a city – impermeable surfaces like concrete sidewalks or asphalt roads keep water from being absorbed into the ground and force water to be above the surface until storm drains clear out or until it reaches the limits of the city
- Human population – with growing populations, more people are affected by floods every time

Orange County is at a higher elevation than most of the surrounding counties and serves as the headwaters for many of the major rivers in the area, including Shingle Creek, Reedy Creek, Cypress Creek, and the Little Econlockhatchee River. This translates into a decreased amount of extended flooding periods as compared to

surrounding counties as much of our waterways flow away from the county and its jurisdictions.

Historical information on past floods in the City of Orlando and Orange County is sparse. The largest flood event in recent memory occurred in 1960 as a result of Hurricane Donna. Heavy rainfall in the early spring and late summer of 1960 left the soil saturated and resulted in a higher than normal water table level. When Hurricane Donna passed through the area that September, it caused extensive flooding across Orange County. The flooding associated with this hurricane has been estimated to be between a 50-year (2% probability) to a 100-year event (1% probability) for portions of the county.

The City of Orlando has experienced street flooding in the area east of the Executive Airport. Incidents of flooding in Orange County include localized flooding near Big Sand Lake and Little Sand Lake that occurred in August 2003 and 2005. During the 2003 occurrence, Central Florida received an estimated 7.5 inches of rain causing water levels to rise significantly. Record rainfall caused Big Sand Lake to rise nearly 9 feet in a single year.

Flooding can also originate due to excessive rainfall that collects in other water bodies. Table 6 shows the historic peak, the date of the historic peak, and the date of the first year of record keeping. All elevations shown are referenced to the North American Vertical Datum (NAVD).

Orange County has 12 major watersheds with over 690 waterbodies, several of which may experience flooding. The county's eastern border is the St. Johns River, with some conservation lands that may flood occasionally. Lake Apopka is Orange County's largest lake with a surface area of 30,800 acres (48.125 square miles) with an average depth of 15.4 feet. Orange County's Public Works regularly monitors over 150 lakes as part of its lake index. They have also tracked rain gauge data since 1986 with 14 gauges scattered around the county as most recently reported. There are 12 Stage and Flow gauges for several prominent waterways that have sensors installed that can measure in "real-time" that helps provide accurate and reliable rainfall recordings during weather events to alert residents and emergency management officials when conditions are nearing flood conditions or if inundation should be anticipated in floodplains.

Table 6: Historic Lake Flooding Elevations in Orange County

Flooding Source	Historic Peak (Feet NAVD)	Date of Historic Peak	First Year of Records
Lake Apopka	68.39	October 1936	1935
Lake Barton	95.12	August 1960	1960
Little Lake Barton	94.37	August 1960	1960
Bay Lake	91.10	August 1960	1960
Lake Beauclair	62.58	July 1968	1960
Lake Bell	90.41	August 1960	1959
Lake Bessie	101.22	August 1960	1960
Black Lake	97.37	August 1960	1960
Lake Blanche	99.89	August 1960	1960
Lake Bosse	63.40	August 1960	1960
Lake Butler	100.89	September 1960	1933
Lake Cane	98.90	August 1960	1959
Lake Carlton	62.61	November 1975	1960
Lake Catherine	92.57	August 1960	1960
Lake Charity	71.54	October 1960	1960
Clear Lake	95.56	October 1960	1951
Lake Conway	88.08	August 1960	1960
Lake Cora Lee	73.65	November 1960	1960
Crooked Lake	76.96	December 1960	1960
Lake Destiny	90.36	October 1960	1960
Lake Dora	64.79	1927	1927
Lake Down	100.74	January 1960	1960
Lake Fairview	89.10	August 1960	1959
Lake Faith	71.34	November 1960	1960
Little Fish Lake	100.86	August 1960	1960
Lake Fuller	67.49	September 1960	1960
Lake Gandy	74.31	August 1960	1960
Lake Georgia	60.43	October 1959	1959
Lake Hart	63.88	September 1945	1941
Lake Herrick	80.05	November 1960	1960
Lake Hiawassa	81.42	November 1960	1960
Lake Holden	91.01	September 1960	1959
Lake Hope	72.89	October 1960	1960
Lake Irma	55.34	September 1960	1959
Lake Jessamine	92.86	September 1960	1959

Flooding Source	Historic Peak (Feet NAVD)	Date of Historic Peak	First Year of Records
Johns Lake	97.55	August 1960	1959
Lake Kilarney	84.28	August 1960	1959
Lawne Lake	91.54	September 1960	1959
Lake Lockhart	74.51	August 1960	1960
Long Lake	79.53	October 1960	1959
Lake Maitland	66.68	September 1960	1945
Lake Mann	93.41	September 1960	1959
Lake Mary	93.36	August 1960	1960
Lake Mary Jane	63.79	March 1960	1949
Lake Ola	72.79	November 1975	1959
Lake Orlando	85.40	August 1960	*
Lake Phillips	63.96	September 1960	1960
Lake Pinelock	94.23	September 1960	1959
Lake Pleasant	81.27	December 1960	1959
Pocket Lake	57.27	September 1960	1959
Lake Rose	86.09	November 1960	1960
Lake Rowena	74.33	September 1945	1945
Lake Ruby	116.34	August 1960	1960
Big Sand Lake	99.52	November 1960	1959
Little Sand Lake	100.90	August 1960	1960
Lake Shadow	83.30	August 1960	1960
Lake Sheen	100.05	August 1960	1960
Lake Sherwood	87.46	October 1960	1960
South Lake	94.78	August 1960	1960
Spring Lake	100.76	September 1960	1960
Lake Steer	85.98	November 1960	1960
Lake Sue	72.74	September 1964	1960
Lake Telfer	59.19	September 1960	1960
Lake Tibet	99.83	October 1960	1960
Trout Lake	73.93	December 1960	1959
Turkey Lake	95.94	August 1960	1960
Lake Warren	86.57	August 1960	1960
Lake Waunatta	62.04	September 1960	1960

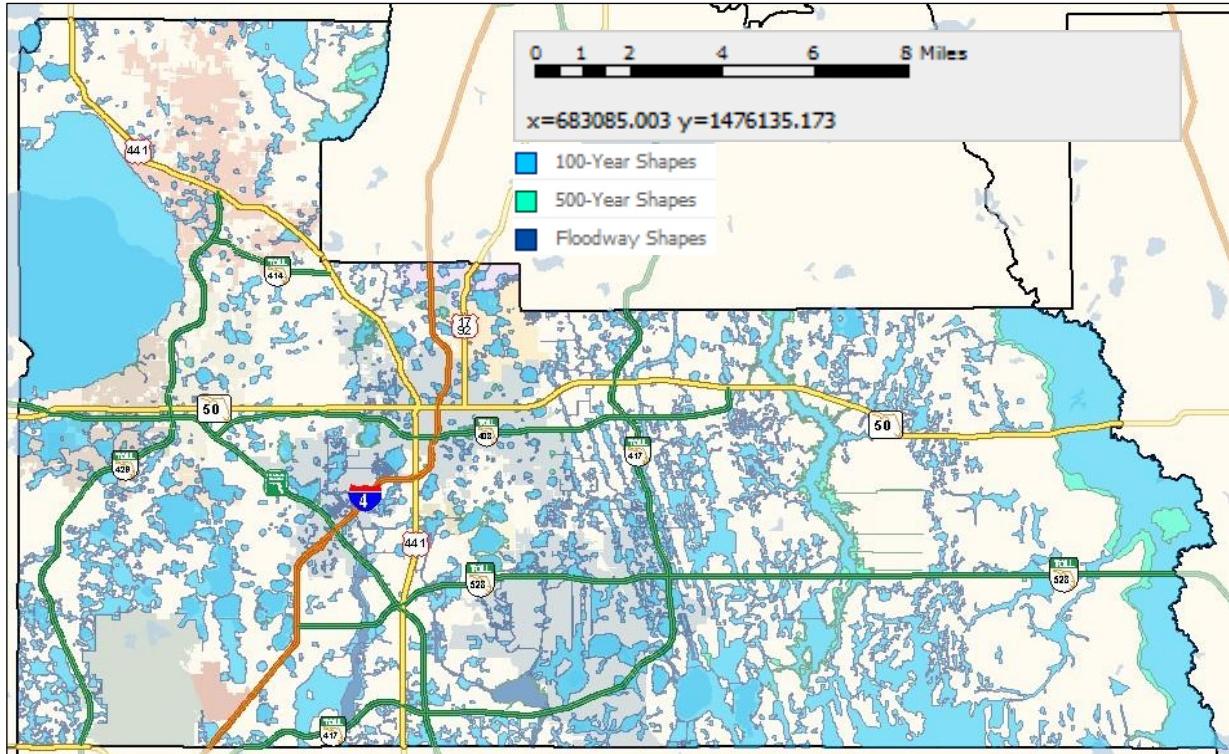
Source: Orange County Public Works, Stormwater Management Division

Table 7: Total Area in Floodplains in the City of Orlando

Total Area in 100-Year Floodplain (%)	Total Area in 500-Year Floodplain (%)	Total Area Floodplain (%)
19.09	0.63	19.72

Source: Orange County Public Works, Stormwater Management Division

Figure B: Floodplains in Orange County



Source: Orange County InfoMaps

While there is no standard rainfall depth that will create flooding conditions throughout the City of Orlando, some areas may be more flood-prone than others. The western portion of Orange County is characterized by high recharge areas with many landlocked systems. These areas are typically affected by the total amount of rainfall during a storm event rather than the intensity of the storm. In contrast, the flatter eastern portion of Orange County is characterized by riverine systems, such as the Little Econlockhatchee River, Boggy Creek, the Big Econlockhatchee River, and the St. Johns River. These parts are more sensitive to storm intensities, or the rate of rainfall. The groundwater table in the eastern portion of Orange County is also generally much closer to the land surface, which hampers soil infiltration during a storm event.

Most storm events in the City of Orlando, or approximately 90% of storms, create 1 inch or less of rain. Based on studies conducted by Orange County Public Works, flooding problems generally begin with the mean annual storm, or 4.5 inches in 24 hours (Table 8). However, some parts of Orange County have experienced localized problems with 2-3 inches of rainfall.

Table 8: Storm Events – Rainfall Amount

Storm Event	Rainfall Amount
Mean Annual / 24 hour	4.5 inches
10 Year / 24 hour	7.5 inches
25 year / 24 hour	8.6 inches
100 year / 24 hour	10.6 inches

Source: Orange County Public Works, Stormwater Management Division

Orange County's current development code calls for the use of increasingly higher storm event mitigation depending on what is being constructed or developed. The more critical structures are designed to a higher standard as their function is essential to operations in the City of Orlando and Orange County (Table 9).

Table 9: Development Criteria

Description	Storm Event
Roadway (secondary)	10-year
Ponds	25-year to 100-year
Residential	100-year
Roadway	50-year to 100-year
Critical Facilities	500-year

Source: Orange County Public Works, Stormwater Management Division

Some areas of Orange County are more flood-prone than others. The floodplain map in Figure B shows those areas of Orange County that are designated as being within the 100-year and 500-year floodplain as delineated by the Federal Emergency Management Agency (FEMA) as part of the National Flood Insurance Program (NFIP). The NFIP was created to help provide a means for property owners to protect themselves financially. The NFIP offers flood insurance to homeowners, renters, and business owners if their community participates in the NFIP. Participating communities agree to adopt and enforce ordinances that meet or exceed FEMA requirements to reduce the risk of flooding. The unincorporated area of Orange County takes part in NFIP, as does the City of Orlando. In addition, the City of Orlando also participates in

the Community Rating System (CRS), which recognizes and encourages community floodplain management activities that exceed the minimum NFIP standards (Table 10).

Table 10: NFIP and CRS Participation in the City of Orlando

NFIP Community ID	Initial Flood Hazard Boundary Map (FHBM) Identified	Initial Flood Insurance Rate Map (FIRM) Identified	CRS Entry Date and Class
120186	08/02/1974	09/03/1980	10/01/1993 Class 6

Source: FEMA, NFIP, and CRS

The City of Orlando has participated in the NFIP program since the early 1980s, and the Orange County Stormwater Management Division continues to implement and enforce all aspects of the NFIP. Listed below are some of the efforts undertaken to maintain compliance with NFIP requirements:

- a. Review all development projects impacting the FEMA established floodplain.
- b. Ensure that compensating storage is provided when projects affect the floodplain.
- c. Ensure that no development is impacting the designated floodway.
- d. Issue floodplain permits that ensure compliance with FEMA regulations.
- e. Review Elevation Certificates to ensure structures were built at the appropriate elevation.
- f. Continue to update FEMA floodplain maps as new data becomes available.
- g. Initiate new flood studies to amend/update floodplain mapping (several on-going projects).
- h. Mitigate known flooding problems by constructing drainage improvements.
- i. Maintain primary and secondary drainage systems. Primary systems include major canals, ponds, control structures, drain wells, and pump stations. The secondary system is composed of stormwater conveyance to the primary system.

The Orange County Stormwater Management Division engages the community in additional activities every year to help promote the NFIP and CRS programs, as well as to bring a general level of flood awareness to Orange County residents through:

- a. Flood prevention and flood insurance information on the county website.
- b. Community meetings at Home Owner's Associations (HOAs).
- c. Participation in community-wide outreach (e.g. Annual Hurricane Expo).

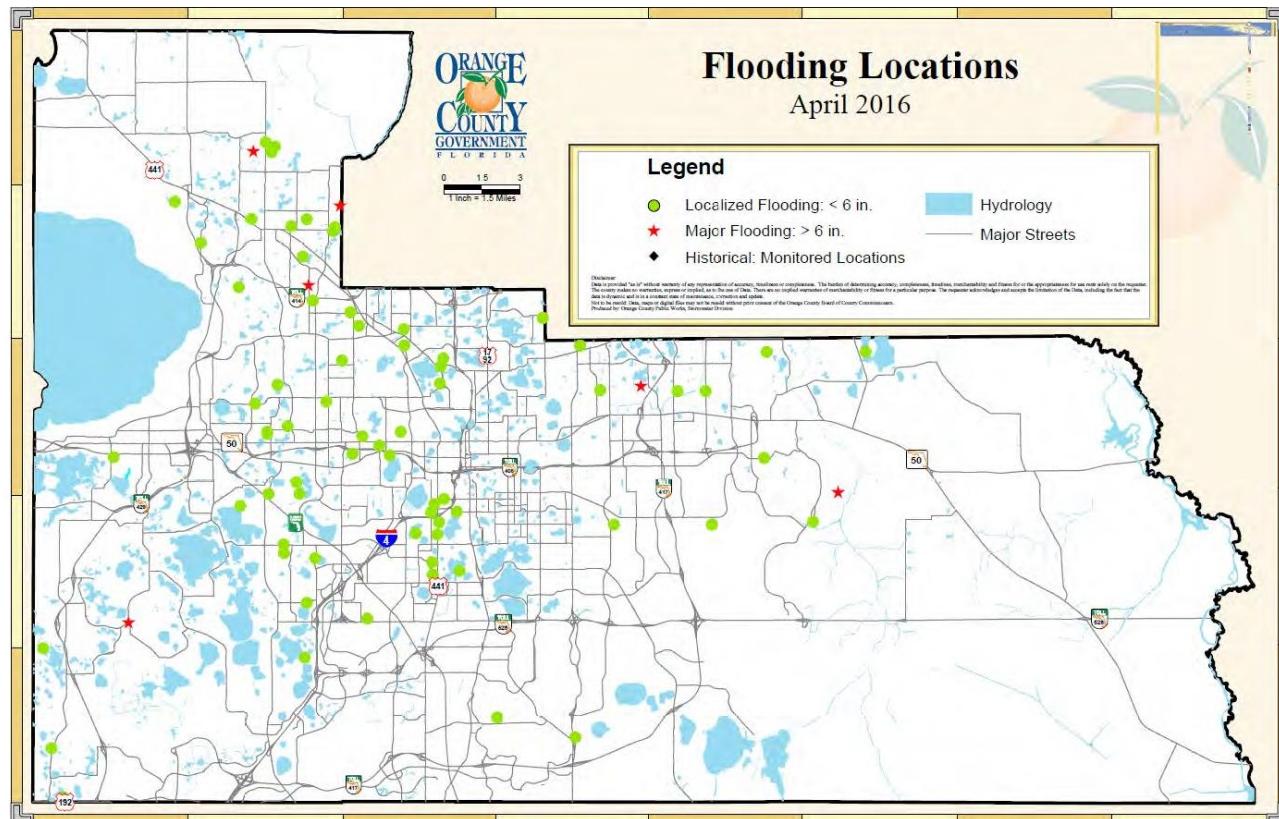
- d. Flood prevention and flood insurance yearly mailing to all residents within floodplain (approximately 225,000 letters).
- e. Handouts and reference material available to the public at the Orange County Public Works Department Office.
- f. Copy of FEMA flood insurance maps available at Orange County Public Libraries.
- g. Floodplain layer available through the Orange County Public InfoMap, an online GIS tool.

Extent: Due to the generally flat topography in Orange County, just a few inches of rain can mean the difference between ‘Normal High Water Elevations’ (NHWE) and 100-year flood levels. Orange County Public Works monitors 120 lakes as part of its lake monitoring program. They have also tracked rainfall data since 1986. The current rainfall network consists of 14 gauging stations scattered throughout the county. There are 12 stage sensors, and flow is calculated at several prominent waterways. The gauging stations have sensors that measure data in ‘real-time’, which provide accurate and reliable rainfall data during weather events that can be used to alert residents and emergency management officials of potential flooding.

In 2010, Orange County’s rainfall gauges measured 1,852 different ‘storms’ that were defined as rainfall events that did not have a gap or inter-event dry period of more than four consecutive hours with rainfall. Of these, only 54 instances (2.9%) recorded rainfall of more than 2.00 inches; the number of storms that last longer than 6.00 hours totaled 250 storms (13.5%). Between 1940 and 2010, Orange County’s average annual rainfall was 51.68 inches with a minimum of 30.38 inches and a maximum of 68.74 inches. During the period from 2000 to 2010, there were seven years in which higher than average rainfall occurred: 2001-2005 and 2008-2009.

Rainfall is closely tied to flooding. Figure C provides a map of the routine flooding locations across Orange County as determined in April 2016. These locations range from depths of 1 to 18 inches. The amount of rainfall has a direct relationship to flood depths. For instance, 4 inches of rain across a wide area could generate over 12 inches of flood water depth. As much of Orange County is urbanized and runoff amounts have increased, this tends to be the case.

Figure C: Flooding Locations in Orange County



The Orange County Public Works Stormwater Division tracks floods that occur in Orange County and the City of Orlando. A few of these locations were severely flooded in 2008 as Tropical Storm Fay drenched the area and caused localized flooding throughout Central Florida. Major flooding occurred to the north and east of Orange County in neighboring counties receiving up to 27 inches of rain from the storm. Orange County recorded over 7 inches of rain during this incident causing minor flooding. The depth of 6 inches is the Stormwater Division's line of demarcation as to what is considered to be major flooding. For example, other locations throughout Orange County typically experience less than 6 inches of floodwaters but are considered to be localized or historical flooding.

The majority of Repetitive Flood Loss (RFL) incidents occur during years with higher than average rainfall. Since 1978, RFL properties are any insurable building for which the NFIP paid for two or more claims higher than \$1,000 within any rolling 10-year period.

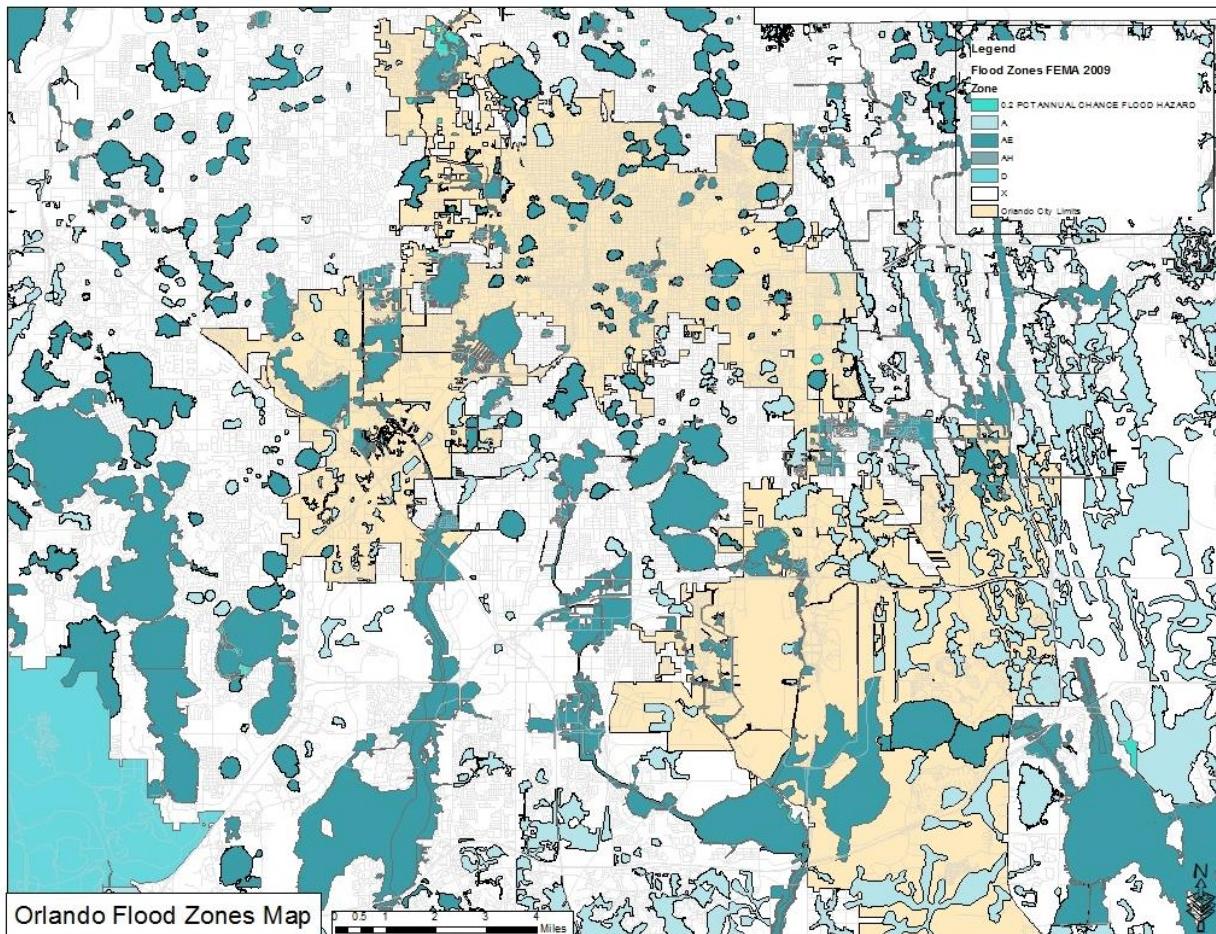
Table 11: Repetitive Flood Loss (RFL) Properties in the City of Orlando

Occupancy Type	Flood Zone	Number of Losses
Single Family	X	2
Non-Residential	X	4
Non-Residential	X	4
Total RFL Properties		10

Probability: The classification of floodplains is due in part to the probability or return rate of a level of water. For instance, 100-year floods are calculated to be the level of flood water expected to be equal or exceeded every 100 years on average. This means that a flood has a 1% chance of being equaled or exceeded in magnitude in any single year; a 500-year floodplain has a 0.2% chance. These locations may include areas adjoining a stream, river, or another body of water. Flooding has the potential to occur every year, but the severity can significantly change with each occurrence. While flooding is still possible in years with less than average rainfall, Repetitive Flood Loss (RFL) properties tend to occur when there is higher than average rainfall during that year.

To help determine areas prone to flooding for the National Flood Insurance Program, the Federal Emergency Management Agency publishes the Flood Insurance Rate Maps (FIRM). FIRM maps are based on elevations, historical occurrences, and other such data and are the basis for determining flood insurance rates based on the corresponding flood zone. These maps are primarily for insurance rating purposes, but the zone differentiation can be very helpful for other floodplain management purposes. Properties located within the FEMA designated floodplain area are at a higher flooding risk (shown in the FEMA FIRM panels). Figure D includes the 100 and 500-year floodplain and areas outside the floodplain (i.e., Zone X). According to Figure D, Zones A, AE, AO, and AH, are the most vulnerable areas. There are several drainage areas within Orange County which would be similarly affected, including the Big and Little Econlockhatchee Rivers, the St. Johns River, Boggy Creek, and Shingle Creek.

Figure D: Flood Insurance Rate Map (FIRM)



Impacts: Freshwater flooding associated with tropical cyclone events is one of the leading causes of storm-related deaths. Fortunately, there have not yet been any recorded instances for loss of life related to flooding in the City of Orlando.

Nonetheless, flooding may inundate potential evacuation routes and flooded roads can result in fatal accidents. Rainfall associated with tropical systems varies by the size of the storm, forward speed, and other meteorological factors. The rainfall associated with a hurricane is expected to be from 6-12 inches, with possibly higher amounts, while the greatest rainfall amounts occur from weaker storms that move slowly or stall over an area for extended periods.

Currently listed RFL properties across Orange County have recorded over 61 different flood claims to property, with significant losses for both building damage and contents. NFIP since 1978 indicates that the total losses are about \$2.5 million, with about 500 claims at an average claim of \$4,800.

The geographic area that is affected because of a flood is relatively small with inundation occurring specifically in lower lying areas or near obstructed stormwater management structures like drains and culverts. The area of Orange County that is situated in a 100-year floodplain is considerable. Economic impacts have the potential to be high as several properties related to the City of Orlando and Orange County's critical infrastructure are situated in floodplains or near water bodies that can flood. This hazard could disrupt government services and businesses, as well as cause significant disruptions in critical infrastructure (electrical, telecommunication, roadways, water, wastewater, etc.). In the past, these impacts felt have been moderate with isolated utility outages, but the potential still exists for critical facilities to be impacted.

Flooding of homes and businesses can result in displaced residents, and can directly affect the financial stability of individuals. Those without flood insurance or underinsured by flood insurance will be most personally affected. The degree of personal and employment loss will determine whether the event will have broader implications and result in a loss to per capita income. This loss is somewhat offset by flood insurance but may not be able to recuperate the total loss. Homeowners of substantially damaged properties will likely incur additional expenses, as homeowners may be required to bring their property up to the most current local codes and standards. Also, property values, particularly for repetitive flood structures, may also suffer, as citizens become aware of the financial risk involved in living in unmitigated structures in flood-prone areas.

Mitigation Measures: Several current mitigation measures are being undertaken by the City of Orlando and Orange County concerning the hazard of flooding. Perhaps one of the most significant steps is participating in the NFIP and CRS. Training and exercises on flooding take place at least every other year with simulated events geared towards the impacts of flooding and damage assessment. There are some logistical support equipment and teams used by the City of Orlando and Orange County to mitigate flood hazards, including a sandbag program and other public works equipment that can be deployed before or after a flood event. Warning systems like safe and flow gauges and rainfall monitors, as well as public notification systems, allow the City of Orlando and Orange County to alert residents and visitors to the potential for flooding, especially in areas that are prone to inundation.

Vulnerability: The City of Orlando and Orange County are situated near the center of the state. Two major river systems flow from Orange County: the St. Johns River that flows north towards Jacksonville, and Hunter's Creek which flows south to the headwaters of the Everglades. A network of other rivers, streams, canals, and creeks

crisscross Orange County. Due to its relatively flat topography, falling water tends to collect and pond in certain low lying areas. Several large water bodies can cause issues of rising water as well.

With over one-third of Orange County area being in a 100-year floodplain, the flood hazard can be very prevalent, especially in years with higher than average rainfall. Urban development throughout the City of Orlando increases the amount of impermeable surface and creates the need for a robust infrastructure system to handle and redirect large amounts of water away from structures. Flooding that occurs in the urban areas tends to be the result of localized flooding where stormwater drainage systems become overwhelmed due to run-off or obstructed drains, but once cleared, the flood waters recede quickly. It is estimated that over 148,000 people and over 118,000 structures are vulnerable to flooding with an estimated total structure value above \$110 Billion in Zones A, AE, AO, and AH.

Significant structural losses to buildings and contents help to place the City of Orlando's vulnerability to this hazard fairly high. Several mitigation activities are in place, such as the various monitors, gauges, and public notification systems help to reduce our exposure to flood. The City of Orlando participates in the NFIP as well as the CRS.

Risk: Medium – 43% There is a high probability that the City of Orlando will experience flooding in the future. The potential rate of return for a flood incident is about 2.33 years. The amount of area that resides in the 100-year flood plain for unincorporated Orange County is high, but less than 25% of the area for the City of Orlando. Typically, disruptions would be limited to a small geographic area. Previous property damages since 1978 total about \$2.5 million with over 500 claims in Orange County. Since there have not been any reported serious injuries or deaths and the mitigation systems that are already in place have received a good deal of attention and resources, the City of Orlando's overall risk to this hazard is moderate due to the number of people affected and the costs associated with flooding.

Severe Thunderstorms

Thunderstorms are a common occurrence in the City of Orlando, as well as throughout Florida, especially during the hot summer months. A mid-afternoon thunderstorm is almost a daily event. Thunderstorms are created when warm, moist air rises and meets cooler air; these storms can produce lightning, high winds, hail, tornadoes, and heavy rain, which can cause flooding. Only about 10% are considered severe, according to NOAA. To be considered severe, the NWS states that the thunderstorm must include

one of three characteristics: produces winds greater than 58 miles per hour, produces hail that is 0.75 inches in diameter or greater or produces tornadoes.

Thunderstorms, hail, and lightning affect a relatively small area when compared to other weather events, like tornadoes or tropical systems. The typical thunderstorm is about 15 miles in diameter and lasts an average of 30 minutes. Despite their small size, all thunderstorms can be dangerous. Of the estimated 100,000 thunderstorms that occur each year in the United States, about 10% are classified as severe. The severe thunderstorm hazard consists of three other sub-hazards, including hail, lightning, and tornadoes. These sub-hazards are described in further detail below.

a. Hail

Hail is composed of ice and can range widely in size. Hailstorms are closely associated with thunderstorms, which form hailstones as they cycle through the storm clouds multiple times. The hailstones are suspended by the strong upward motion of the air until the updraft of wind can no longer carry the weight of the hail and they fall to the ground, thawing and freezing on the way down. Hailstones generally fall at faster rates as they grow in size, though other factors such as melting, friction, wind, and rain or other hailstones can slow them down. Severe weather warnings are usually issued for hail when the stones reach a damaging size, causing serious property damage to automobiles and structures, as well as agricultural interests.

Many times, hail is combined with other severe weather hazards such as lightning. Since 1960, there have been over 240 recorded hail events in Orange County with a magnitude greater than 0.75" size hail according to NWS data. The most common hail size was 0.75" with 99 occurrences, followed by 1.00" (64) and 0.88" (32). In some cases, multiple hail events were recorded on the same day, but they were in a different location or were of different magnitude (size). From 2010 to 2018, 51 hail events took place across Orange County.

Table 12: Hail Event Magnitudes in Orange County, 1960-2018

Hail Size (inches)	Number of Events
0.75	99
0.88	32
1.00	64
1.25	6
1.50	5
1.75	28
2.25	1
2.75	4
3.00	1
TOTAL	240

Source: NWS

Hail can occur anywhere in the City of Orlando. Recordkeeping by the NWS for locations where hail occurred did not begin until 1994. Location information before then does not appear to have been maintained in NWS data. Since unincorporated Orange County covers the largest area, the majority of reported hail events took place there while the City of Orlando has had multiple hail events recorded.

Extent: Hail has been recorded as large as 3.00" in Orange County, but larger hail could form in some extreme circumstances. However, smaller sized hail less than 1.00" in size is more likely to occur. Most hail events last for only a short duration of several minutes as a severe thunderstorm passes through an area. During this time, there can be damage to property, such as building roofs and vehicles that are exposed to the elements.

Probability: The likelihood of hail is high as it is a frequent occurrence in the City of Orlando, mainly due to its direct relationship with severe thunderstorms. From 1960 to 2018, there were 240 recorded instances of hail in Orange County (Table 12). This means that, on average, there are more than four hail events per year. The highest number of occurrences in one year was in 1999 with 24 hail events. Hail can occur throughout the year, as early as February to October; the height of the hail season is in the late spring to summer months as the probability for thunderstorm activity is at its peak as well.

Impacts: There have been fairly moderate impacts due to hail in the City of Orlando. To date, there has been no loss of life or reported casualties. However, there has been some property damage; the NWS may not record other property damages, especially

to vehicles from visitors or those driving through Orange County. Reported property damages are listed at \$60,300 from three hail events. SHELDUS™ reports much more significant damages for both property damage (\$31,623,066.67) and crop damage (\$500,500.00) in its statistics. Spatial impacts have been fairly isolated as hail does not generally affect large areas of the City of Orlando all at once. Economic impacts to critical infrastructure have been minor. No outages for utilities were reported, but hail storms have the potential to impact electrical lines or transformers if their size were to be large enough to cause significant damage. Fortunately, no such effects have been recorded. An increased number of hail events could lead to a greater amount of overall damage, even though individual events do not produce a large amount of damage on their own.

Mitigation Measures: Due to its high frequency but low impacts, hail can be difficult to mitigate on a large scale basis. Property owners could install impact-resistant roofing materials to help prevent severe impacts from larger sized hail. This hazard is mentioned in the City of Orlando CEMP, but very few other plans. Training and exercises on hail do not occur with any degree of regularity. Very little logistical resources or support teams are devoted to hail on its own, but these may be included as part of a response to other associated hazards like severe thunderstorms, lightning, or tornadoes.

Vulnerability: The City of Orlando is vulnerable to the effects of hail due to its frequency and probability for return. Fortunately, reported damages from NWS remain relatively low and with no loss of life or injuries. Spatial impacts are limited to small locations.

Risk: Medium – 52% The overall risk from hail is categorized as a medium threat mainly because of the low impacts. Even with a high probability for occurrence with only minor mitigation measures currently in place, the City of Orlando has not been severely impacted by hail in the past. The potential for impacts to occur is moderate, especially to property, buildings, vehicles, and other infrastructure assets that could be compromised by hail damage. Hail is generally a component of other hazards that may have more significant impacts in the City of Orlando.

b. Lightning

Lightning is one of the other products of severe thunderstorms that can cause damages, casualties, or deaths. Lightning is a giant electrical charge that sparks in the atmosphere or between the atmosphere and the ground. In the initial stages of development of a thunderstorm, the air acts as an insulator between the positive and

negative charges in the cloud and between the cloud and the ground. When the difference in charges becomes too great, the capacity of the air to act as an insulator breaks down. Then there is a rapid discharge of electricity that is seen in the form of lightning. Lightning can occur between opposite charges within the thunderstorm cloud (intra-cloud lightning) or between opposite charges in the cloud and on the ground (cloud-to-ground lightning). One of the main dangers of this hazard is that lightning cannot be forecasted.

Florida leads the nation in lightning-related deaths and injuries. Since 1959, an average of ten people has been killed and 33 injured each year as a result of lightning. The peak month for lightning strikes is July, but June and August have a significant number, and no month is immune from lightning danger. Actual occurrences of lightning strikes in the City of Orlando are nearly too numerous to count. Table 13 shows the annual lightning strikes in Orange County from March 2009 to December 2015 with a total of 468,053 strikes.

The focus on this hazard should be directed at lightning strikes that caused severe damage or impacts, either through loss of life, injuries, and/or property damages. According to SHELDUS™ data, there have been 70 lightning events since 1960 with associated damages across Orange County. NWS data, which only goes as far back as 1996, has far fewer recorded events, with 33 instances of lightning strikes where damages, injuries, or casualties occurred.

Table 13: Annual Lightning Strikes in Orange County

Year	Number of Strikes
*2009	66,017
2010	53,494
2011	32,943
2012	40,082
2013	39,645
2014	53,124
2015	182,748
Total	468,053

*Note: Lightning strike data began in March 2009

Source: Earth Networks Weather Stations in Orange County, 2009-2015

Extent: There is no official severity scale or magnitude range associated with lightning at this time. Lightning can heat the surrounding air to as much as 50,000°F, which is five times as hot as the temperature of the sun. When air is heated, it expands rapidly and creates the sound of thunder. To measure the extent for the lightning hazard,

Orange County utilized information collected from Earth Networks/Weather Bug that provides support to its array of weather stations around the county that records lightning strikes from March 2009 to December 2014. By using a Geospatial Information System (GIS), Orange County Emergency Management was able to plot lightning strike density throughout Orange County. Each “raster,” or cell, on the map represents an area of about 13 acres (757 square feet). It then measured the number of lightning strikes with a one-mile radius of the cell area for one year. The data was split into years because the lightning strikes would be so dense that there would not be enough contrast. Density values range from zero strikes to upwards of 121 lightning strikes within a one-mile radius. The worst-case scenario for the number of lightning strikes occurring within a mile of a single raster would be over 121 strikes within a one-mile radius.

Referring to Table 13, each year, from 2009 to 2015, saw varying numbers of lightning strikes. A pattern was not easily detected visually on each map. However, some of the commonalities from year to year are that small pockets of lightning strike activity were present in the urbanized portions of the City of Orlando. Unincorporated areas of south-central Orange County near the various theme park attractions and International Drive also recorded high densities of lightning strikes.

Since 1960, SHELDUS™ recorded 70 lightning strikes that impacted people, property, or natural environments in Orange County. A worst-case scenario for a lightning strike would be measured by the amount of damage, injuries, or casualties caused by a single event. During one particular lightning event on August 16, 1998, two men were struck and killed by lightning while they were fishing in a canoe on Lake Mack in Orlando. Such events are direct damages caused by lightning. These do not account for the indirect damages that lightning can create as they relate to other hazards, such as with wildfire.

Probability: The probability of lightning strikes in the City of Orlando will remain high as it is directly tied to the likelihood of severe thunderstorms. The lightning strikes that cause property damages, injuries, or casualties should be more infrequent. Thousands of cloud-to-ground lightning strikes may occur each year. So far, there have been 70 lightning strikes have caused damages or losses in Orange County since 1960. This number represents only a small portion of total strikes that take place and does not include cloud-to-cloud strikes or other lightning without impacts. Due to its unpredictability, lightning has the potential to cause damages during each strike. Lightning has the potential to strike during each month of the year. Much like hail, the height of lightning activity is in the late spring to summer months as the probability for thunderstorms is at its height. Lightning can occur anywhere in the City of Orlando.

Impacts: Since 1960, there have been 79 reported injuries and 16 deaths associated with 70 lightning strikes in Orange County. Property damages are reported by SEHLDUST™ to be over \$3.48 million over 54 years. Awareness about the dangers of lightning has certainly improved over the years with fewer injuries and deaths taking place. Spatial impacts are fairly isolated for a lightning strike, even though a severe thunderstorm system can cover large areas of the City of Orlando. Critical infrastructure services may be interrupted temporarily during a lightning strike with power failures the most likely of these. Other utilities may experience short disruptions because of a power failure, but most critical systems have generator back-ups to avoid an issue. Most power failures are restored within a few hours to a few days following a severe thunderstorm system, depending on the size of the weather system and the number of outages or downed power line. More complex systems may require further time for complete restoration of services.

Technology and detection equipment can play a huge role in preventing injuries from lightning. Systems for emergency notification can also be important to warn individuals who are participating in outdoor activities and let them know to take cover, especially with the number of visitors that the City of Orlando has at its theme parks, sporting events, and recreational activities.

This hazard, if it impacts a home, business, or government facility, can result in thousands of dollars in property damage. At times it can disrupt government services, businesses, and critical infrastructure. Typically, the disruptions will be limited to a small geographic area. Lightning can also create other indirect hazards that impact the City of Orlando, such as wildfires.

Mitigation Measures: Due to its high frequency but low impacts, lightning can be difficult to mitigate on a large scale basis. Property owners could install lightning rods or use non-conductive building materials to help prevent severe impacts from lightning strikes. This hazard is mentioned in the City of Orlando CEMP, but very few other plans. Training and exercises on lightning may be covered as an ancillary hazard for first responders during an event, but very rarely, if ever, as a stand-alone hazard. Some logistical resources or support teams are devoted to responding to the effects of lightning, but mainly for electrical restoration. Other resources are included as part of a response to other associated hazards like severe thunderstorms, hail, or tornadoes.

Vulnerability: The City of Orlando is vulnerable to the effects of lightning due to its frequency and probability for return. Although the City of Orlando has a high incidence of lightning strikes and thunderstorms, there are no significant numbers of people

impacted by these events. The economic costs are low, but response costs tend to be high. All areas in the jurisdiction are considered vulnerable to lightning strikes. All structures are at high risk from lightning strikes unless they have been hardened by lightning mitigation efforts. Fortunately, reported damages in Orange County from NWS remain moderate and with some loss of life and several injuries. Spatial impacts are limited to small locations.

Risk: Medium – 52% The overall risk from lightning is categorized as a medium threat mainly because of the low impacts. With a high probability for occurrence and only minor mitigation measures currently in place, the City of Orlando has had some severe impacts from lightning in the past. The potential for impacts to occur is moderate, especially to property, and individuals who participate in outdoor activities that are unable to find cover during a thunderstorm. Lightning remains very unpredictable, but its impacts can be reduced through better detection technology, public outreach, and emergency notification systems. Lightning is considered by some to be a component of other hazards that may have more significant impacts in the City of Orlando, but awareness of this hazard appears to be on the rise.

c. Tornadoes

Tornadoes are violently rotating, massive columns of air that is in contact with both the surface of the earth and its cloud base. A tornado's wind speed ranges typically from 40 mph to more than 300 mph. They are also described by several names, such as "twisters," "vortexes," or "cyclones." "Funnel clouds" are shaped like their name but do not make contact with the ground. Not all tornadoes have visible funnel-shaped clouds. "Waterspouts," which form over water bodies, are usually weaker than their land-based counterparts. Waterspouts occasionally move inland, becoming tornadoes and cause damage and injuries.

From the 1970s until the mid-2000s, tornadoes were classified by the National Weather Service (NWS) using the Fujita Scale to rate tornado intensity and was based on damages to structures and vegetation. A revised scale, the Enhanced Fujita Scale (EF-Scale), as outlined in Table 14, is currently used by NWS to rate the intensity of tornadoes more accurately. The EF Scale has become the definitive scale for estimating wind speeds within tornadoes based upon the damage done to buildings and structures. It is used extensively by the NWS in forensically investigating tornadoes and by engineers in correlating damage to buildings. All tornadoes are now assigned an EF Scale number. Table 14 outlines the Enhanced Fujita Scale. The strongest tornadoes max out in the EF5 range (more than 250 mph).

Although most people associate tornadoes with the Midwest, Florida has nearly as many tornadoes as many mid-western states. In fact, Florida experiences the most number of tornadoes per square mile of all 50 States. Florida has averaged 52 tornadoes reported per year since 1961, with an average of two fatalities per year. Florida tornadoes are generally of short duration and have a narrower path. These funnel clouds can be spawned by hurricanes and appear predominantly along the right-front quadrant of the storm. While tornadoes are more prevalent in west-central Florida, southeast Florida, and portions of the panhandle, the City of Orlando has seen many of these types of severe weather events over the years. According to NWS data, there have been a total of 14 tornadoes in the City of Orlando from 1950 to 2015 (Table 15).

Table 14: Enhanced Fujita Scale for Tornadoes

Scale	Wind Estimate	Type of Damage
EF-0	<73 mph	Light Damage Some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; sign boards damaged
EF-1	73-112 mph	Moderate Damage Peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos blown off roads.
EF-2	113-157 mph	Considerable Damage Roofs torn off frame houses; mobile homes demolished; boxcars overturned; large trees snapped or uprooted; light object missiles generated; cars lifted off ground.
EF-3	158-206 mph	Severe Damage Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; heavy cars lifted off the ground and thrown.
EF-4	207-260 mph	Devastating Damage Well-constructed houses leveled; structures with weak foundations blown away some distance; cars thrown and large missiles generated.
EF-5	261-318 mph	Incredible Damage Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 meters (109 yards); trees debarked; incredible phenomena will occur.

Table 15: Tornado Strikes in the City of Orlando, 1950-2014

Date	Magnitude	Property	Injuries	Deaths
05/15/1950	F1	\$25,000	0	0
02/25/1961	F1	\$2,500	0	0
06/05/1967	F2	\$2,500,000	0	0
04/19/1969	F1	\$250,000	0	0
01/28/1973	F2	\$2,500,000	16	0
05/12/1976	F0	\$25,000	1	0
07/01/1978	F0	\$250	0	0
04/29/1982	F1	\$25,000	0	0
02/02/1983	F2	\$250,000	0	0
02/02/1983	F2	\$2,500,000	9	0
02/25/1992	F1	\$250,000	11	0
01/07/1995	F1	\$500,000	0	0
06/01/1997	F0	\$20,000	0	0
11/07/2006	F0	\$40,000	0	0
TOTALS	14 Tornadoes	\$8,887,750	37	0

*Note: The Enhanced Fujita Scale was not implemented until 2007

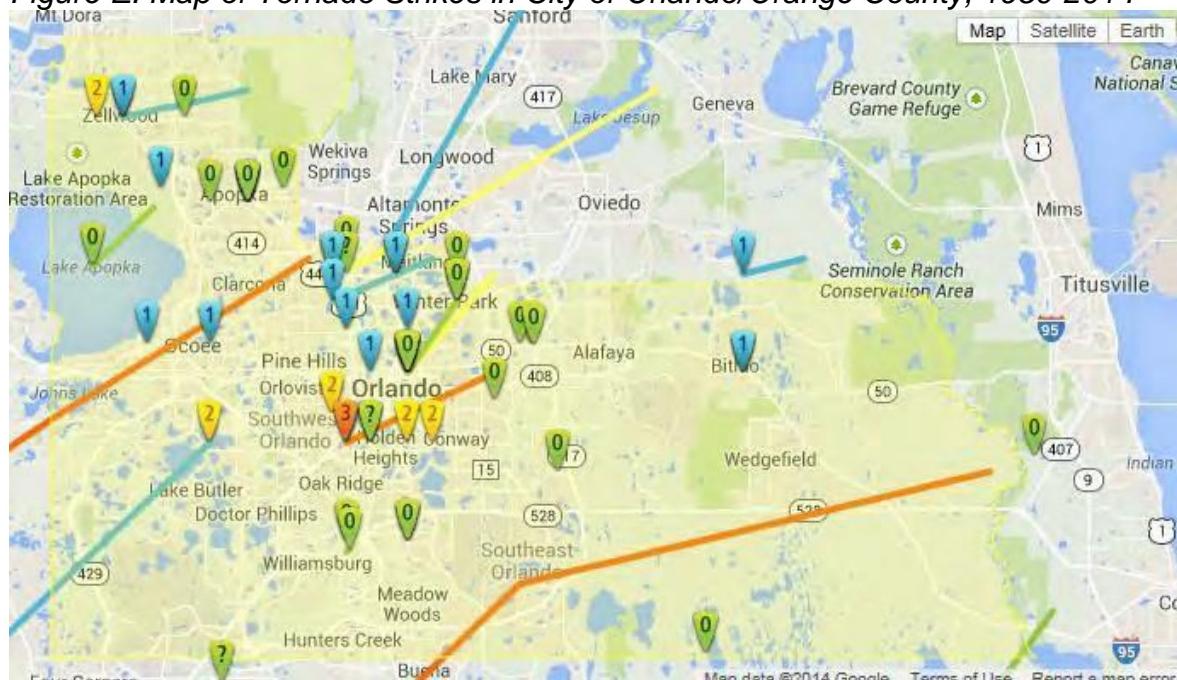
Source: NWS

Florida has two tornado seasons. The summer tornado season runs from June until September and has the highest frequencies of storm generation, with usual intensities of EF-0 or EF-1. This includes those tornadoes associated with land-falling tropical cyclones. The City of Orlando and Orange County experience the highest frequency of tornadoes in June. The deadly spring season, from February through April, is characterized by more powerful tornadoes because of the presence of the jet stream, strong cold fronts, and strong thunderstorms. These storms can move at speeds of 30 to 50 mph, produce dangerous downburst winds, large hail, and usually the most deadly tornadoes. February is the peak month for tornadoes during the spring season. The most frequent storms were weaker tornadoes classified as an F/EF-0 with 23 events and F/EF-1 numbered at 18 reported tornadoes. Stronger storms, like F/EF-2, reported nine events and F/EF-3 tornadoes with three occurrences. The City of Orlando and Orange County have not experienced anything stronger than an F/EF-3. Since 1950, the State of Florida has only experienced one F/EF-4 tornado and no instances of an F/EF-5 magnitude.

Tornadoes can occur anywhere in the City of Orlando and Orange County. Urbanized areas have a greater number of structures and a denser population, which means that a tornado in these areas increases the likelihood that a tornado will cause property damage or human casualties. Areas with several manufactured or mobile homes may

be the most susceptible to the effects of a tornado. Figure E, courtesy of NWS, shows the approximate location and path of each of the above-listed tornadoes.

Figure E: Map of Tornado Strikes in City of Orlando/Orange County, 1950-2014



Source: NWS

Extent: Unlike hurricanes, which produce wind speeds of similar values over relatively vast areas, the maximum winds in tornadoes are often confined to extremely small areas and vary tremendously over very short distances, or even within the funnel itself. Orange County has experienced a total of 53 tornadoes since 1950, comprised mainly of 41 weaker tornadoes (F/EF-0 and F/EF-1). There have only been 12 stronger storms that have touched down inside the borders of Orange County that have been greater than an F/EF-2 during that same time frame. The severity extent that Orange County will most likely experience in the future is the weaker tornadoes like F/EF-0 and F/EF-1. From a worst-case perspective, though, the upper extent of what Orange County and its jurisdictions may experience is an EF-3 tornado. These stronger tornadoes that bring higher winds and more damages are less likely to occur but are not improbable.

Probability: While tornadoes can occur at any time during the day or night, they tend to form during the late afternoon and into the evening. The expected tornado size would be approximately 20 yards wide, with a 1-mile path. Most tornadoes are expected to touch down for relatively short periods in a bounce type pattern. With 53 tornadoes occurring in Orange County over a span of 64 years, there is a good chance that the City of Orlando will experience a tornado on average about once every 1-3

years. These will generally be weaker storms as measured by the Enhanced Fujita Scale. More severe storms have occurred less frequently in the past but based upon the frequency of severe thunderstorms forming across Orange County and the City of Orlando there is equal potential for stronger tornadoes each year. For this reason, the probability for a tornado to occur is categorized as high.

Impacts: The total property damages for the 53 recorded tornadoes in Orange County are listed at over \$36 million. Tornadoes have caused severe impacts in Orange County and the City of Orlando. Records indicate that there have been at least four reported casualties and more than 159 injuries in Orange County. If tornadoes that originated in other areas around Orange County are included, these human impacts would be even higher.

The tornadoes that struck East Central Florida on February 22-23, 1998, are considered to be the deadliest tornado event in Florida history. A total of seven tornadoes struck Osceola, Orange, and Seminole counties killing 42 people and injuring 260 others. One of the tornadoes formed in Lake County as an F/EF-3 and veered into the western portion of Orange County. It continued into Winter Garden, Oakland, Ocoee, and portions south of Apopka. Three people in Orange County died with over 70 injured. Three of these storms were rated as F-3s on the original Fujita scale. A total of approximately 3,000 structures were damaged and nearly 700 destroyed. These tornadoes caused over \$15 million worth of property damages and constituted the single most costly tornado event to have occurred in Orange County.

In the last 50 years, the City of Orlando experienced several F0-F2 tornadoes. The impact was minimal at the time because of the sparsely populated areas that were affected. In 2004, an F-0 or F-1 tornado struck the Deerwood Mobile Home Park, damaging 14 manufactured homes. On October 7, 2006, an F-0 tornado caused major damage to 32 homes and minor damage to 28 others; three businesses also suffered damage. This incident resulted in a Small Business Administration (SBA) agency-level disaster declaration for the affected area.

Tornadoes could disrupt government services and businesses as well as cause significant disruptions within our critical infrastructure (water, wastewater, electrical, telecommunication, etc.). Typically, the disruptions will be limited to a small geographic area. Nevertheless, the economic impacts of tornadoes can be devastating, causing disruptions to utilities, downed power lines, blocked roadways, and wind-borne debris can impact critical infrastructure and other buildings. The response efforts could last for several days or weeks even, depending upon the severity, with recovery for homes,

businesses, and other structures taking even longer. A tornado impacting the City of Orlando could result in millions of dollars in property damage and lost revenue.

Spatial impacts are typically small and isolated as Florida does not experience very large tornadoes. The swath of damages for the more intense tornadoes in Orange County was, of course, larger than the weaker systems. The widest path for a tornado in Orange County was 500 yards from an F/EF-1 tornado in 1969 with a path length of 5.6 miles. The longest path was an F/EF-1 from 1968 that ran 69.3 miles from Hillsborough County through Polk and Lake County until it finally reached Orange County and stopping near Windermere. Similar to hurricanes/tropical storms the impact citywide is dependent on its path and intensity. In the event a tornado touches down, it usually damages select neighborhoods and communities, but it seldom has a citywide impact.

Mitigation Measures: Due to their prevalence, the City of Orlando has taken several steps to mitigate the hazard of tornadoes. Where tornadoes can strike is not as predictable as all of the City of Orlando has the same probability of being hit. For this reason, training and exercise drills take place to help familiarize response personnel with their roles and responsibilities, as well as outlining their actions to respond to a tornado event. Because tornadoes can spawn from tropical systems like hurricanes or tropical storms, there is usually some emphasis placed on the possibility for tornadoes during the annual State Hurricane Exercise, in which the City of Orlando participates in conjunction with Orange County. Orange County has purchased other support supplies and equipment as part of its anticipated response to tornado events. Orange County also has a Citizen Assistance Response Team that has gone out to neighborhoods to help residents with debris from fallen trees and putting up tarps on impacted roofs so that water leaks do not enter the building.

Vulnerability: Due to the frequency and unpredictable pattern of tornadoes and their relatively high frequency of recurrence, all of the City of Orlando is extremely vulnerable to induced damages. The probability of tornado occurrence and damage potential is high due to the concentrations of populated areas throughout the City, which means that the costs associated with an individual tornado event may be high, based on the event and location. As the number of structures and people increase, the potential damage and injury rates increase. Mobile and modular homes, substandard housing, apartment complexes, and/or housing projects may be extremely susceptible to damage and destruction from wind or wind-borne debris during a tornado event.

Depending on the severity or magnitude of the tornado, Orange County has experienced several casualties and several injuries due to this hazard. Property

damages have also been high as a result of tornado activity. Even though the storms usually affect a small width or an isolated geographic area, the path can stretch for miles. Building codes in the State of Florida were designed mainly for tropical systems like hurricanes, but tornadoes are more compact than hurricanes. Their concentrated wind strength can weaken the structure's envelope and compromise the building. Other wind-borne debris can impact property, structures, vehicles, and power lines. This can disrupt the daily operations of the City of Orlando until normalcy is reestablished.

Risk: High – 71% The overall risk from tornadoes is categorized as a high threat mainly because of the significant impacts this hazard poses to people and property. In addition, there is a high probability for an occurrence to affect the City of Orlando and Orange County. The mitigation measures currently in place can help to reduce recovery times, but this hazard will still occur. Tornadoes remain very unpredictable, but their impacts can be reduced through better detection technology, public outreach, and emergency notification systems.

Tornadoes are the most significant of the severe thunderstorm associated hazards and awareness of this hazard appears to be on the rise. Emergency management officials in the City of Orlando and Orange County have distributed NOAA weather radios for the past several years and plans to continue doing so to help residents receive important warnings when severe weather happens. The NWS and other media outlets now have improved radar capabilities that can detect potential cyclone activity to issue watches, warnings, and other advisories.

Sinkholes/Land Subsidence

The City of Orlando is susceptible to land subsidence ranging from slow-developing small diameter sinkholes to more massive sinkholes that can develop with little or no warning. Sinkholes are geologic hazards, sometimes causing extensive damage to building structures and roads. Sinkholes may also threaten water supplies by draining unfiltered surface water directly into the aquifer.

The geological bedrock of Florida is especially susceptible to sinkholes because it is situated on a peninsula consisting of porous carbonate, mostly limestone, which stores and helps move groundwater. Sediments of dirt, clay, or sand sit atop this carbonate rock layer. Over time, as rainwater naturally becomes acidic while seeping through the soil, the acid created from oxygen in water percolates through these carbonate rocks and dissolves them relatively easily, forming openings underneath the limestone roof. The resulting Swiss-cheese-like terrain, which is referred to as "karst," is honeycombed with cavities. When the overlying sediments of dirt, clay, or sand eventually get too

heavy to support the limestone ceiling of the underground cavity, they can suddenly collapse into the void and form a cavernous sinkhole at the surface.

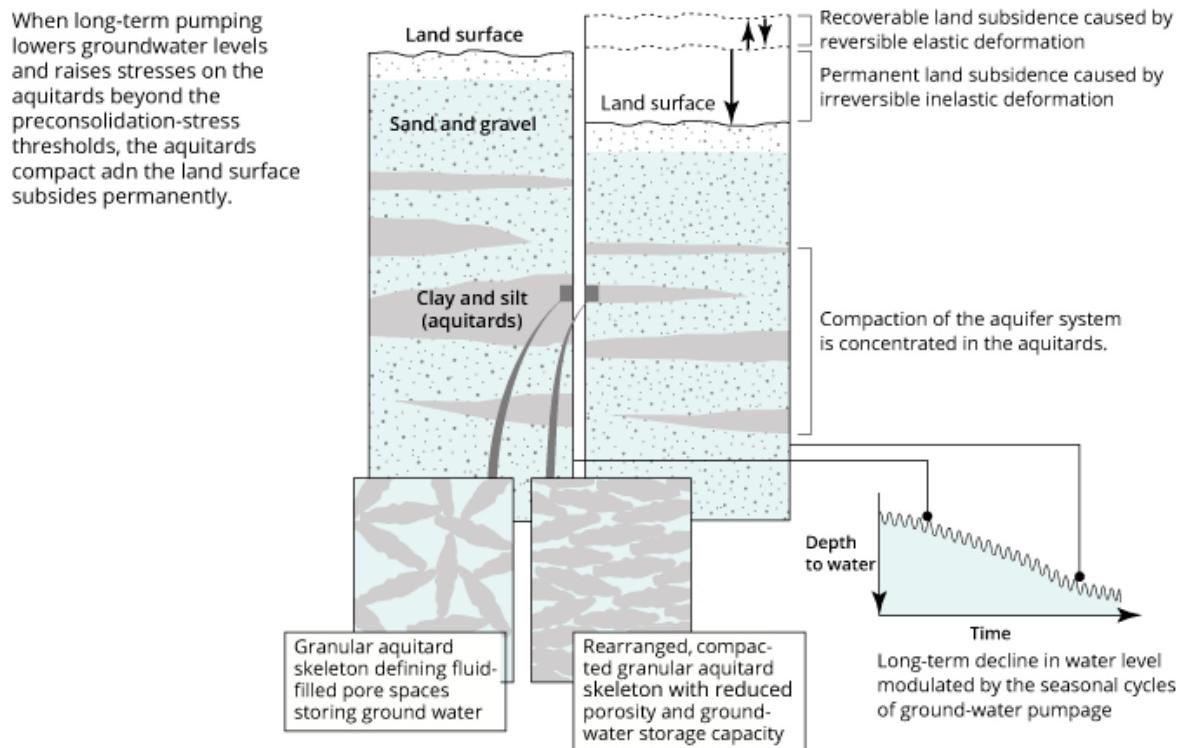
Carbonate rocks such as limestone cover 13% of the Earth's total landmass and the problems they create plague not only Florida but also much of the United States, Europe, China, and elsewhere. Florida is particularly vulnerable to sinkholes because its layers of limestone are, at most, only a few tens of millions of years old and have not had time to become compressed and, therefore, more resistant to dissolution and erosion. In many places, interleaved layers of sand from prehistoric beaches enhance the erosion of limestone. Layers of clay near the surface are strong enough to hold sediments together even as voids form beneath them, but when the clay does give way, the chasms can be immense.

Although sinkholes may naturally form through cycles of drought followed by heavy rainfall from hurricanes and tropical storms, they can also be caused by human activity such as the pumping of groundwater, which can cause dramatic fluctuations in the delicate water table that keeps the karst stable. In either case, the main trigger for sinkholes is water—too much of it, or too little.

The normally moist soil of Florida has a stabilizing effect on karst terrain. However, during a drought, cavities that were supported by groundwater empty out and become unstable. After heavy rain, the weight of pooled water can strain the soil, and the sudden influx of groundwater can wash out cavities.

As the risk of sinkholes in Florida is more than ten times greater in developed areas than undeveloped areas, human-made development is the most persistent cause of increased sinkholes. The heavy pumping of groundwater from local aquifers to spray on agricultural fields or irrigate lawns and golf courses is a significant risk factor. Other common human activities that cause sinkholes are well drilling, excavating, and creating landfills using earth-moving equipment that scrapes away protective layers of soil, as well as buried infrastructure that can lead to broken water lines leaking into the karst, and pounding or blasting from construction. Sinkholes can also be spurred by parking lots and paved roads that divert rainwater to new infiltration points, the weight of new buildings pressing down on weak spots, and retention ponds built on golf courses that leak underground.

Figure F: Aquifer Compaction due to Groundwater



Source: USGS

Land subsidence occurs when the extraction of large amounts of groundwater from an aquifer exceeds the aquifer's capacity to recharge (see Figure F). Aquifers are permeable, water-bearing geologic units that store groundwater. During periods of drought, water availability from surface sources typically decreases, and groundwater supplies are tapped by more frequent intensive pumping, drilling of deeper wells. When water is pumped out of an aquifer, the water pressure is reduced. In some cases, the reduction in water pressure results in a loss of support for the overlying soil, and compression occurs. This compression is what causes land subsidence. Depending upon the soil conditions, sometimes the compression can be reversed when the groundwater is recharged, but often the compression and associated subsidence become permanent.

Problems associated with land subsidence include damage to buildings, roads, railroads, storm drains, canals, levees, bridges, and wells. A long and intense dry spell of drought can lower the ground so much that it creates fissures in the earth and tears apart the foundations of houses, bridges, industrial sites, and other structures. In the

worst case, shifting soil can cause whole buildings to collapse. The land that buildings sit on can fall and compact when large amounts of groundwater are withdrawn from the aquifers below ground. Land subsidence is a human-induced event.

Climate change will magnify the risks with rising average temperatures, more erratic rainfall and higher levels of radiation from the sun. As the trend towards drier weather continues, occurrences of drought and land subsidence will become even more frequent and more severe. A seemingly incongruent yet frequent effect of land subsidence is flooding due to changes in drainage patterns. This is particularly common in low-lying areas adjacent to bodies of water, where even minor changes in ground surface elevations can have devastating effects.

According to the Florida Department of Environmental Protection (FDEP) Florida Geological Survey (FGS) Subsidence Incident Report (SIR) database, 195 sinkholes were reported by citizens in Orange County between 1961 and 2014 (Table 16). These land subsidence events were not verified by geologists but were reports from citizens when land subsidence occurred that they were aware of. The number of reported sinkholes received by the FDEP FGS SIR is very different from the number of property insurance claims received. Between 2006 and 2010, Orange County had over 510 claims filed, or 2.06% of all claims filed in the State of Florida during the same period.

Sinkhole locations throughout Orange County comprise three different geological areas: Area I, Area II, or Area III. Area I is bare or thinly covered limestone where sinkholes are few, generally shallow and broad, and develop gradually where solution sinkholes dominate. In Area II, the cover is 30 to 200 feet thick and consists mainly of incohesive and permeable sand where sinkholes are few, small, of small diameter and develop gradually, dominated by cover-subsidence sinkholes. Some parts of the City of Orlando are in this category. Area III is covered 30 to 200 feet thick as well. However, it is comprised of cohesive clay sediments of low permeability where sinkholes are most numerous, of varying size, and develop abruptly. Cover-collapse sinkholes are more prevalent in this area that includes the City of Orlando.

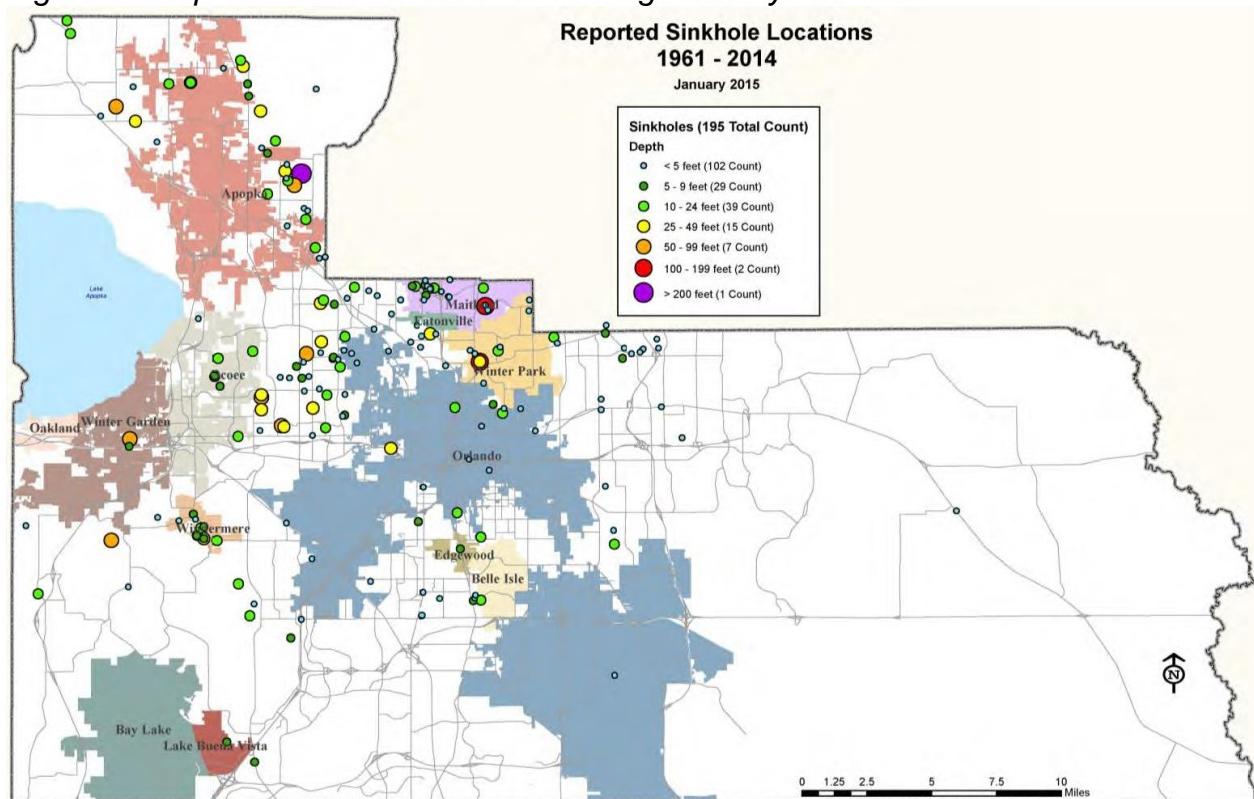
Table 16: Sinkholes in Orange County, 1961-2014

Depth (feet)	Number of Sinkholes
< 5	102
5 – 9	29
10 – 24	39
25 – 49	15
50 – 99	7
100 – 199	2
> 200	1
TOTAL	195

Source: FDEP FGS SIR

Extent: Sinkholes in the City of Orlando come in a variety of widths, lengths, and depths. Most sinkholes are less than five feet deep. With 195 sinkholes reported to FGS, the average depth of a sinkhole in Orange County is 11.35 feet, with an average length and width of 22.05 feet and 22.08 feet, respectively (Figure G). The smaller sinkholes are most commonly the cover-subsidence type that is found mainly in geological Area II of Orange County. These types of sinkholes develop slowly over weeks, months, or even years creating depressions in the ground that can cause building foundations to shift or cracks in floors and walls. They are responsible for the majority of sinkhole-related damage that is reported to home insurance companies in the State of Florida, but they do not receive much attention. The large, cover-collapse sinkholes in Area III are generally deeper. These sinkholes develop much more rapidly with catastrophic consequences to buildings, roadways, or other structures by forming open holes in the earth. While the City of Orlando may experience smaller, cover-subsidence sinkholes, it may also occasionally have more severe instances of cover-collapse.

Figure G: Map of Sinkhole Locations in Orange County 1961-2014



Source: FDEP FGS SIR

Probability: The return rate of sinkholes in Orange County amounts to nearly four instances per year since 1961. For this reason, the likelihood of recurrence of sinkholes in the City of Orlando and Orange County is high while the extent of damages will be variable based upon the severity of the subsidence. Weather events, like drought, flood, or tropical systems can affect the number of sinkholes that take place as the subsidence is the result of the dissolving of our limestone bedrock. Rapid changes in the water table elevation due to drought, heavy rainfall, or pumping are some of the key triggers for sinkhole formation. Surface loading due to new construction development, well drilling, or new water drainage patterns from runoff can also factor into subsidence events, but these are less common.

Impacts: Direct impacts due to sinkholes are difficult to determine as FDEP FGS does not currently track damage estimates for each of the reported sinkholes that have occurred previously in either the City of Orlando or Orange County. Some of the estimated side effects across the State of Florida have included decreases in home values due to sinkholes, as well as a significant increase in insurance premiums. Loss estimates from the entire State were reported at greater than \$1.4 billion across 24,671 claims from 2006 to 2010. The City of Orlando has not experienced any human

impacts for loss of life or injuries related to this hazard. According to the Florida Office of Insurance Regulation, from 2006 to 2010 there were approximately 510 property insurance claims made in Orange County for sinkhole damage. The average expense for both open and closed claims was \$9,936.35, which would mean about \$5,067,538.50 total insurance expenses for Orange County sinkhole claims. While this is not an exact dollar amount of actual property damages, this is the most current and available data that exists.

Spatial impacts are relatively low as sinkholes are generally isolated incidents. Some sinkholes may occur at or around the same time as other sinkholes, but generally, there is some separation of time between incident reports. They do not affect large geographic areas, but some sinkholes can draw large amounts of attention. Economic impacts have a moderate level of risk, especially to the insurance industry. Sinkholes have the potential to impact critical infrastructure, roadways, bridges, and water bodies. Disruption of services could also potentially occur as electric, water, sewer, gas, and telecommunications utilities have underground service lines that could be damaged or exposed as the result of a sinkhole.

Mitigation Measures: Sinkhole awareness has been on the rise in the State of Florida. A pilot study program in the North Central Florida region is currently underway and will be implemented statewide in the next few years to help determine the potential sinkholes by creating a predictive model using geospatial information systems (GIS) and probability statistics. This planning project hopes to enhance other mitigation strategies. As this plan is not yet in place, sinkholes are discussed as a hazard in other plans maintained by the City of Orlando. Sinkholes as a hazard are generally not exercised, and there are limited training courses conducted on sinkhole mitigation. City of Orlando Public Works does have some logistical support in the remediation of sinkholes to assist with stabilization, but this occurs on a case by case basis.

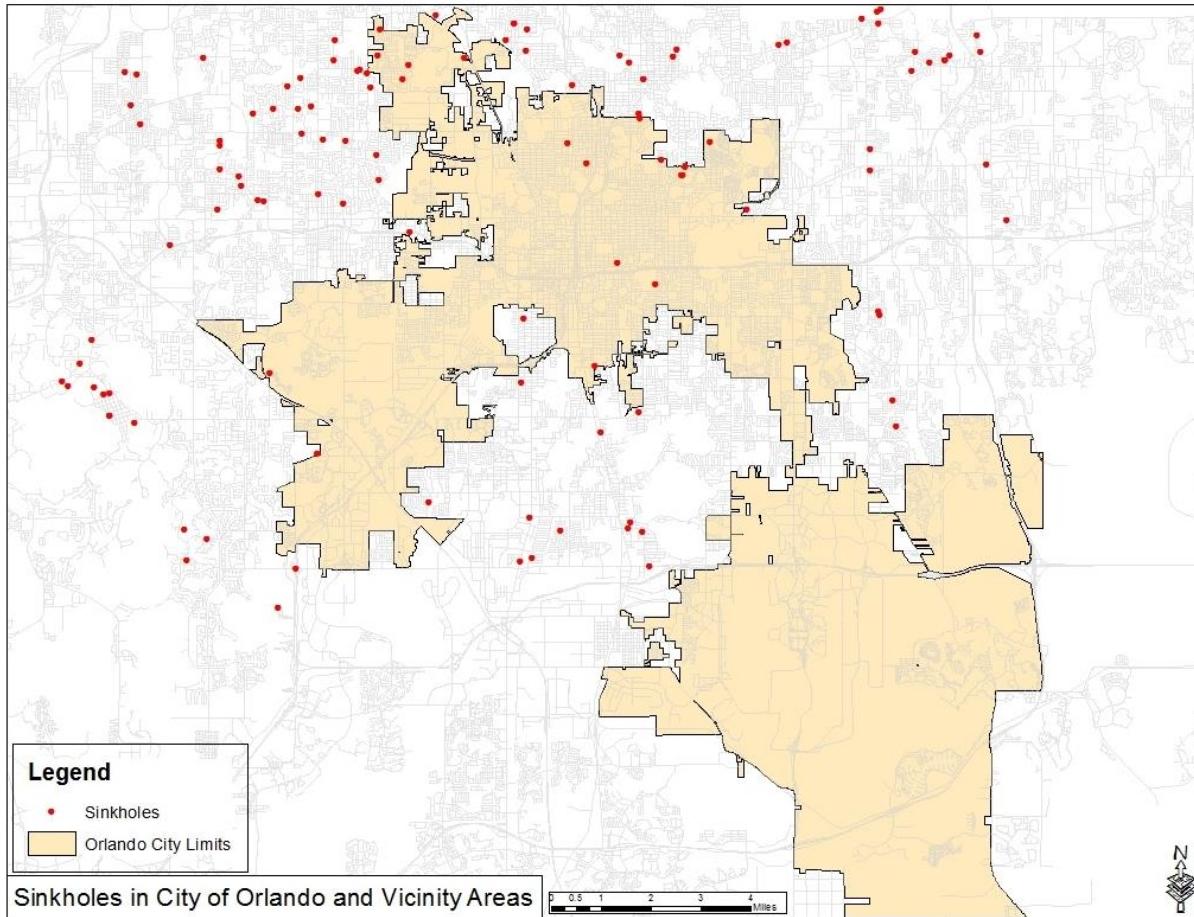
Vulnerability: The City of Orlando is vulnerable to sinkholes as they are a recurring hazard that can be highly unpredictable in where they occur or how often. Property insurance claims have been on the rise in Orange County, so it is reasonable to expect that further incidents will continue to happen in the future.

The overall impacts are mainly to property and economic disruptions. These subsidence events are geographically isolated to a concentrated area and normally occur in certain parts of the City of Orlando. While there have not been any reported losses of life or casualties due to sinkholes, other parts of the state have seen them, so there is some potential that this could take place in the City of Orlando.

The severity of sinkholes varies from large incidents that are cover-collapses to smaller depressions that are cover-subsidence. Though property insurance coverage may not be enough to mitigate this hazard for the future properly, other mitigation measures are tough to come by for this hazard due in part to its unpredictable nature.

Risk: High – 62% The overall risk from sinkholes is a high threat mainly because of the significant impacts this hazard poses to property and the local economy. Also, there is a high probability for multiple occurrences in the City of Orlando that will affect residents and even businesses. The mitigation measures that are currently in place can only help so much as this hazard remains very unpredictable. Some impacts may be reduced through better research and predictive modeling as a result of the pilot study. Further training and exercises related to this hazard are needed so that first responders and emergency managers are better aware of what can or should be done to address sinkholes as a major hazard. The data in Figure G was generated by Florida Center for Instructional Technology (FCIT) and represents reported sinkhole events in the City of Orlando and Orange County based on data gathered by the Florida Geological Survey (FGS) and the Florida Department of Environmental Protection (FDEP). Figure H shows sinkholes within the city limits since 2008.

Figure H: Sinkholes in the City of Orlando and Vicinity Areas since 2008



Hazardous Materials

Hazardous materials (HazMat) are substances that are used every day in a variety of industrial and commercial applications. These are deemed to be dangerous due to their toxic nature, through flammability, radioactivity, explosive, corrosive, oxidizing, asphyxiating, bio-hazardous, pathogenic, or allergenic nature.

The accidental or purposeful release or spill of these volatile substances into the environment where human, plant, and/or animal life could be endangered comprises this hazard. Many times, these types of incidents are caused by accidents that occur due to human error(s). They are often unpredictable, no notice events that can cause significant loss of life, property damage, and economic disruption.

The use of hazardous materials, such as chemicals, toxic substances, and radiological materials, have become commonplace in both urban and rural communities. The

transportation of these agents or elements has become commonplace in our society, with uses across the board from industry to agriculture, medical procedures to water treatment, communications to research, and other technological uses. There are over 6,000 hazardous chemicals licensed for transport by the U.S. Department of Transportation, many of which may have a disastrous effect if released in an accident.

A variety of hazardous materials are moved into, out of, through, or within the boundaries of the City of Orlando and Orange County. Leaks, spills, or releases can occur from the containers that are transported on the multi-modal network that crisscrosses the City of Orlando and Orange County via highway, surface roads, airports, and rail lines. This hazard poses a threat to a large number of residents and visitors.

While it is recognized that other potentially dangerous materials are regularly being transported to, from, through, and within Orange County, the primary hazard identified for analysis in the City of Orlando are chemicals. It is also important to note that this hazard is related to the spill or release of the materials and is distinct from the terrorism hazard and is addressed separately in the City of Orlando CEMP.

For chemicals, the types of Extremely Hazardous Substances (EHS) are described in Title III of the Superfund Amendments and Reauthorization Act (SARA) of 1986. These refer to various chemicals that could cause serious health effects following short-term exposure from accidental releases. The State of Florida passed a law, referred to as the Emergency Planning and Community Right-To-Know Act (EPCRA) in 1988, for the local regulation of these chemicals. For the first time, the passage of the EPCRA allowed emergency planners, responders, and the public access to facility-specific information regarding the identification, location, and quantity of particular hazardous materials at fixed sites.

EPCRA requires facilities that maintain certain chemicals at particular threshold quantities to report annually to state and local emergency officials. In addition, facilities must immediately notify officials of any releases of harmful chemicals that have the potential to result in offsite consequences or impacts to the environment or atmosphere. This information is utilized to prepare emergency plans for hazardous materials incidents, to allow responders to receive training based on specific known threats, and to inform and educate the public regarding the chemicals present in their communities.

According to E-Plan, a hazardous material database, Orange County currently has more than 700 fixed facility locations that report the presence of hazardous chemicals

and over 200 sites that use, store, and/or produce extremely hazardous substances (EHS) in mandated threshold amounts. A total of 49 facilities are located within the City of Orlando limits. Figure I shows locations of Section 302/EHS HazMat Sites within the City of Orlando.

According to a report from the State Watch Office (SWO), since 2001 there have been 136 HazMat incidents from a mixture of transportation and fixed facilities, as well as a variety of involved chemicals. Most of the releases that are transportation-related involve petroleum chemicals or non-EHS chemicals. There were 106 reported spills such as gasoline, diesel fuel, automotive oil, ethylene glycol, propane, or a mixture of these. There were also nine reports of a release of an EHS chemical, which were mainly from fixed facilities. The SWO utilizes contacts from facilities, county watch offices, transportation operators, and other first responders for their information.

In addition to these reports, the State Emergency Response Commission (SERC) maintains information on various HazMat incidents that are reported statewide that include releases with evacuations, injuries, or fatalities. Some transportation incidents may have included information on injuries or fatalities due to trauma from an automotive accident and are not directly related to chemical exposure. The classification is determined by the local area medical examiner and is reported to the SERC. Table 17 contains information related to reported HazMat incidents that have occurred in the Local Emergency Planning Committee (LEPC) District, a six-county district that includes Brevard, Lake, Orange, Osceola, Seminole, and Volusia Counties. The reported incidents originated at both fixed facilities and transportation incidents for petroleum and non-petroleum chemicals. On average, there are a higher number of transportation incidents than fixed facility incidents. These occurrences are the more notable incidents that are reported to the SWO and/or the SERC and do not include every release of hazardous materials that may occur within Orange County.

Figure I: Section 302/EHS HazMat sites within the City of Orlando

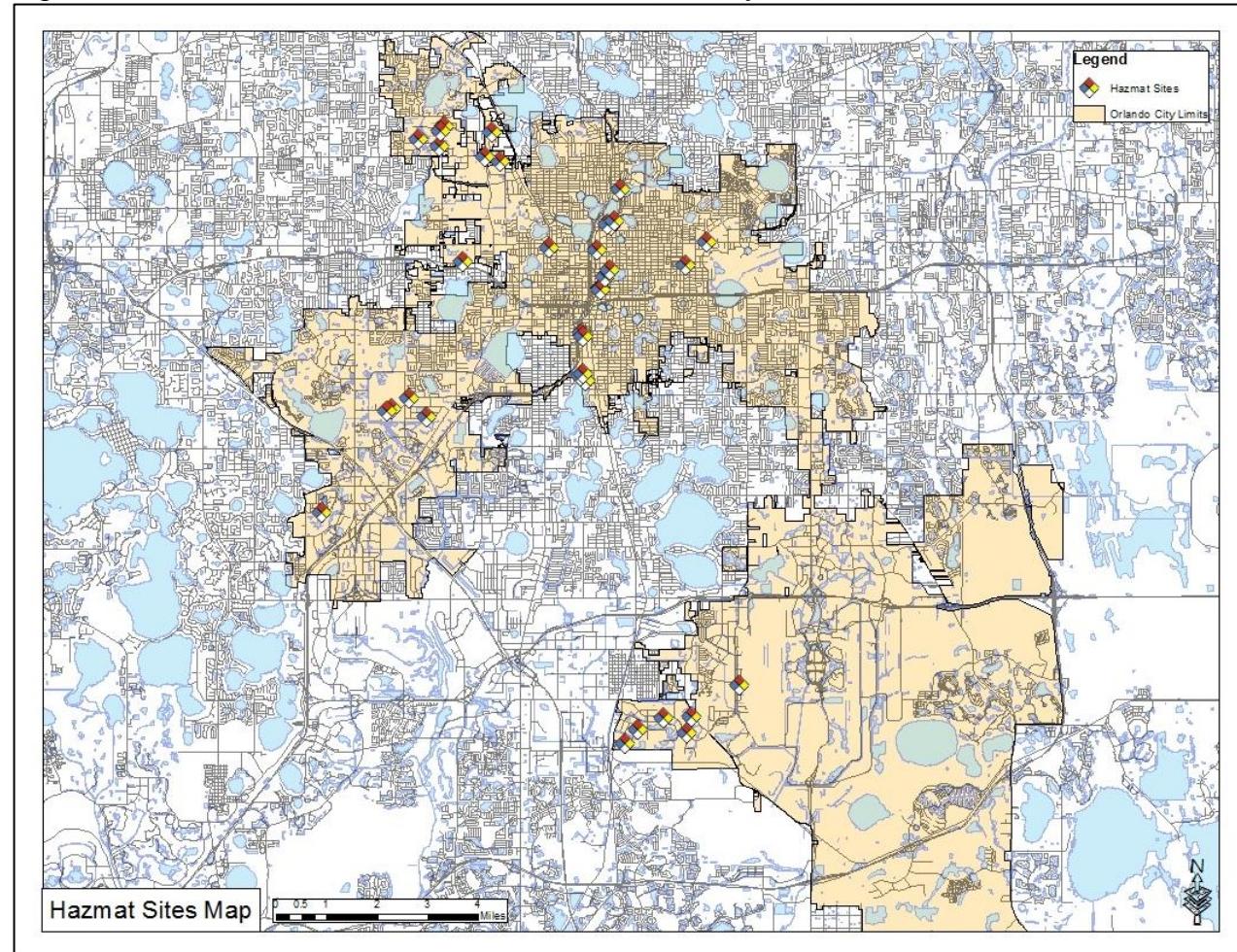


Table 17: Hazardous Materials Incidents in LEPC District VI, FL

Incident Type	2010-2011	2011-2012	2012 – 2013	2013 – 2014	Average*
Fixed Facility Non-	39	28	32	40	35
Fixed Facility Petroleum	33	27	31	25	29
Transportation with	93	114	125	126	115
Transportation without	37	32	37	21	32
TOTAL	202	201	225	212	210

*Rounded to the nearest whole number

Source: State Emergency Response Commission (SERC)

Other previous occurrences in Orange County can be found in the list of Superfund sites in Table 18. These sites were designated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) that are polluted

places that require a long-term response and monitoring to clean up contaminations. None of the sites listed have been deleted or partially deleted from the list.

Table 18: Superfund Sites in Orange County

ID Number	Facility Name	Reason Added	Proposed	Listed	Construction Completed
FLD0040 64242	Chevron Chemical Co. (Ortho Division)	Soil and groundwater contamination by pesticides, petroleum products, and VOCs, including xylene from waste disposal practices at a former pesticide formulation plant. Contaminated soil has been removed.	01/18/1994	05/31/1994	02/10/1998
FLD0559 45653	City Industries, Inc.	Soil and groundwater contamination by poor waste handling processes and intentional dumping by a former industrial waste handling business. The site was abandoned with around 1,200 drums of hazardous waste and thousands of gallons of sludge in storage tanks. Wastes and contaminated soil were removed in 1983-1984; groundwater is being treated.	06/24/1988	10/04/1989	03/02/1994
FLD9841 69235	Orlando Former Gasification Plant	Soil and groundwater are contaminated by coal tar waste products. This site is listed as a Superfund Alternative Site.	-	-	-
FLD0499 85302	Zellwood Ground Water Contamination		12/30/1982	09/08/1983	09/16/2003

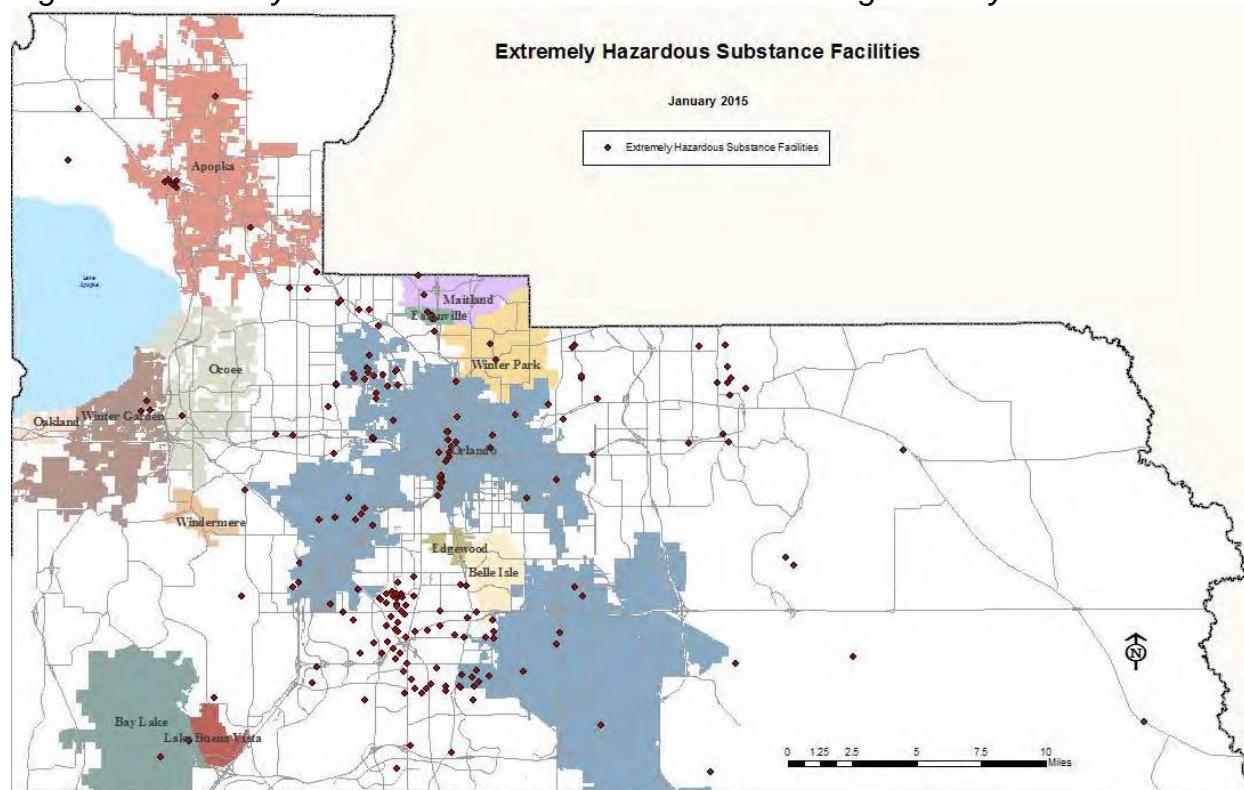
Source: http://en.wikipedia.org/wiki/List_of_Superfund_sites_in_Florida

There are 213 fixed facilities in Orange County that hold chemicals that are designated as Extremely Hazardous Substances (EHS) (Figure J). These facilities can be found in almost all of the jurisdictions in Orange County, including Apopka, Bay Lake, Eatonville, Lake Buena Vista, Maitland, Ocoee, Orlando, Winter Garden, Winter Park, and across the unincorporated county areas. Releases of chemicals have the potential to occur at each of these facilities. As delineated in the Super Fund Amendments and Reauthorization Act (SARA) Title III, Section 302, Orange County conducts a hazards analysis of all identified facilities every other year to determine the chemical's vulnerability zone radius and the approximate population in any critical facilities located within that zone that would need to evacuate. Critical facilities include schools, hospitals or other medical facilities, fire stations, and police stations. This information is provided to the individual facility, first responders, the LEPC District, and the SERC/State. Coordinating procedures for hazardous materials response on the part of the City of Orlando may be found in the OFD Standard Operating Procedure (SOP).

Precise locations for other transportation-based releases are more difficult to obtain. They generally occur along major transportation routes, such as the interstate highways, toll roads, state roads, and significant county roads. Petroleum products are the primary chemical spills from these incidents, but they are less significant. Rail lines may also experience releases of chemicals of increased severity and quantity. Passive transportation of chemicals in Orange County utilizes a pipeline system for natural gas that is managed by Peoples Gas System. This pipeline enters Orange County in the northwestern portion of the county around Apopka and moves south to Osceola County. Other spurs come off of this main line towards downtown Orlando and east towards Brevard County.

Of the four previously mentioned Superfund sites, two are in unincorporated Orange County, and the other two are in the City of Orlando; and of these, one is listed as a Superfund Alternative site. The environmental remediation and clean-up/construction have been completed on all of these sites. All of these sites have human exposure and groundwater migration under control. The future use for these sites will be limited for the foreseeable future, and they will continue to be monitored and evaluated.

Figure J: Extremely Hazardous Substance Facilities in Orange County



Source: E-Plan – Emergency Response Information System, 2015 Chemical Inventories

Extent: There have been numerous HazMat incidents over the past several years, most of which have been relatively minor or involving less dangerous chemicals. The majority of spills are related to petroleum products that mainly pose a threat due to their flammability.

There have been some serious HazMat releases in Orange County and its jurisdictions. On December 14, 2004, Orange County Fire Rescue responded to a possible nitric acid explosion in unincorporated Orange County where the acid was exposed to water from the sprinkler system. There were no serious injuries or damages to the structure. On September 26, 2013, a chemical explosion occurred in downtown Orlando. A vacant warehouse was being used for storage of 'carbo-hydriillum', an experimental fuel, when the gas cylinder ruptured and combusted, which shook several high-rise buildings in the urban area nearby. A large hole in the building opened up, about 50 feet wide by 20 feet high on the north side of the building. All of the windows were broken, and debris was scattered over a 100-foot area around the rear of the building. There was no fire present when responders arrived, along with no injuries or fatalities. The chemical had a sudden release of pressure as it was being stored inside an incompatible gas cylinder. Several buildings in the vicinity evacuated as a

precaution, but there were no other reported damages other than the impacts to the warehouse itself.

It is anticipated that releases of chemicals and spills of petroleum products will continue to occur in the City of Orlando and Orange County. The majority of these will not be severe, but there is always some potential for a large scale release to occur. Facilities that store chemicals are scattered about Orange County and those with EHS chemicals are concentrated in industrial areas. These areas are not as populated, but other facilities are located in more commercial and/or residential areas that may increase the chance of exposure.

Probability: There are over 200 fixed facilities that house extremely hazardous substances (EHS) in Orange County. The likelihood of an incident occurring is high as there will continue to be hazardous materials present through the continued use of chemicals at fixed facilities and their transport to, from, through, and within Orange County and its jurisdictions. With the City of Orlando being part of a large metropolitan area and centrally located in the State, it serves as a primary highway and freight passage route in the region for goods that are being transported north and south on the Florida peninsula to Jacksonville or Miami, as well as east or west between Daytona Beach/Port Canaveral and Tampa. The likelihood of transportation incidents is amplified due to the number of possible encounters that can occur in a multi-modal setting. The most likely incident that may arise would involve a petroleum product spilling onto a roadway or other impermeable surface that would then require some form of clean-up. This may occur during a vehicle accident along one of Orange County or the City of Orlando's major transportation routes and railroad systems.

Other releases at fixed facilities will also continue to happen. While the number of instances will likely be lower than the transportation incidents, the chemicals involved, such as EHS chemicals like chlorine, ammonia, sulfur dioxide, will be higher in their severity than petroleum products. The degree to which these releases or spills impact the county, either in quantity, severity, or location is an unknown variable. Continued emergency planning, accuracy for inventory reporting, and preparedness training must continue to occur to help reduce the number of occurrences.

Impacts: The potential impacts on humans due to a HazMat release would potentially be severe, depending on the chemical, the quantity released, and the location where an incident occurred. Several scenarios have been conducted by the LEPC District to show the possible outcomes of a large-scale release at some of the chemical facilities in the City of Orlando or Orange County or from multi-modal transportation sources. The majority of the releases at facilities that produce and store extremely hazardous

substances are small, affecting only the building of origin and a relatively small number of people. However, there are several major transportation routes and railroad tracks crisscrossing the City of Orlando, which increases the probability to high for this hazard affecting the City's population. Historically speaking, the number of injuries or deaths has been relatively low, making it a moderate impact overall.

Property damage information is not yet available as there is currently no mechanism in place to track this type of data. In most cases, property damages are low as a HazMat release or spill without any other catalysts will produce localized damages. Other factors that may increase property damages, such as fire, explosions, releases of pressure, water reactivity, or the presence of other chemicals can all exacerbate the emergency response and destroy or further damage building.

The impacted geographic area during a HazMat/chemical release is relatively small, depending on the type of chemical or other environmental factors like temperature, wind speed, or topography. It is possible that certain chemicals in more substantial quantities could disturb a greater area, but it is unlikely that this would have a citywide impact or cover more than 25% of the land area of Orange County.

The economic impact is difficult to quantify due to a release or spill of hazardous material. It is possible that severe interruptions may follow after an incident, especially if an incident occurred at critical facilities, utility stations, or closures to transportation networks. Other outreaching economic impacts due to a spill or release may negatively impact the industrial area where the incident took place, such as the Superfund sites. Businesses that may need to evacuate or "shelter-in-place" would be affected during a release and could not operate. Residential neighborhoods and the real estate market may experience difficulty for sale of homes, condos, or apartments if an incident creates long-term issues. Most cases would see a short-term impact where individuals would be evacuated and would return to normal after several hours. Road or rail closures could create heavy traffic and schedule delays; while this is mainly an inconvenience for most, there may be other ramifications to emergency service vehicles that may have trouble operating or obtaining access to the incident.

Hazardous materials incidents can also disrupt government services and businesses and cause disruptions in our critical infrastructure (electrical, telecommunication, water, wastewater, etc), but on a minimal basis thus making the economic costs usually low.

Mitigation Measures: There are numerous mitigation measures employed for this hazard. Preparedness planning activities like Orange County's Hazards Analysis program help provide local area responders, the LEPC District, and the State with

information on the quantity, type, and storage methods of chemicals at fixed facilities, as well as calculating vulnerability zones for evacuation purposes. The LEPC District, within which the City of Orlando participates, also maintains a district-wide Hazardous Materials Emergency Plan that addresses direction and control, notification, public information, protective actions, and recovery and reentry. Training courses and exercises are routinely conducted in the City of Orlando and Orange County by various agencies and departments. Because of this, there are several groups of highly skilled teams of Hazardous Materials Technicians that operate specialized equipment with a high level of support.

Vulnerability: The City of Orlando is moderately vulnerable to a release or spill of hazardous materials, mainly due to their prevalence in the City and in Orange County, as well as the high probability that a release will occur. The number of previous incidents is high, especially for transportation-based petroleum spills. Other releases at fixed-facilities are much lower, but releases at the EHS sites would have a much greater expected severity if a catastrophic failure happened. The impacts have been relatively low in the past, but the potential for damages to property, humans, and the economy are moderate.

While most of the smaller municipalities in Orange County do not have large numbers of EHS facilities within their jurisdictional boundaries, the City of Orlando and unincorporated areas of Orange County are more vulnerable because of this along with their proximity to major roadways, highways, toll roads, interstates, airports, or rail lines. The presence of a multi-modal transportation network that carries large amounts of HazMat increases the vulnerability across the board to all of Orange County. Transportation incidents with non-petroleum products are relatively few. The types of substances being transported using these various methods, the location, quantity, and topography of where a hazardous material incident might occur are unknown variables, and this increases vulnerability to this hazard.

Risk: Low – 29% Even with a high probability of incidents, minor to moderate anticipated or potential impacts, and a moderate vulnerability, the risk of a hazardous materials release within the City of Orlando and Orange County is low. This is a result of the significant amount of mitigation measures that take place in the City of Orlando and Orange County to prepare in advance for a release. Training occurs regularly throughout the year, and an exercise with a HazMat-based scenario is conducted by the LEPC on, at least, a bi-annual basis, if not more frequently. The specialized equipment and HazMat teams provide a consistently high level of support for responding to the incidents.

Terrorism/CBRNE

Terrorism is defined in the Homeland Security Act of 2002 as an activity that involves an act that is dangerous to human life or potentially destructive of critical infrastructure or essential resources; is a violation of the criminal laws of the United States or of any State or other subdivision of the United States; and appears to be intended to intimidate or coerce a civilian population, to influence the policy of a government by intimidation or coercion, or to affect the conduct of a government by mass destruction, assassination, or kidnapping.

Terrorism is the use of force or violence committed by an individual or group of varying degrees of organization, which may be foreign or domestic in origin. These actions are carried out against persons that are considered to be civilians or non-combatants, as well as their property, in violation of the criminal laws of the United States for purposes of intimidation, coercion, or ransom. Terrorism affects us through fear, physical injuries, economic losses, psychological trauma, and erosion of faith in government. Terrorism is not an ideology. Terrorism is a strategy used by individuals or groups to achieve their political goals.

Terrorists espouse a wide range of causes. They can be for or against almost any issue, religious belief, political position, or group of people of one national origin or another. Because of the tremendous variety of causes supported by terrorists and the vast array of potential targets, no place is truly safe from terrorism. Throughout the City of Orlando, there is a nearly limitless number of potential targets, depending on the perspective of the terrorist. Some of these targets include government offices, pregnancy centers, religious facilities, public places (such as shopping centers), schools, power plants, refineries, utility infrastructures, water storage facilities, dams, private homes, prominent individuals, financial institutions and other businesses.

Terrorists can use a multitude of methods to invoke fear and inflict damage amongst a target population. Terrorists' hazards may be a 'Weapon of Mass Destruction' (WMD) or conventional explosives, secondary devices, and combined hazards, or other means of attack, including low-tech devices and delivery, attacks on infrastructure, and cyber terrorism.

A WMD is defined as any chemical, biological, or radiological weapon that is designed or intended to cause widespread death or serious bodily injury through the release, dissemination, or impact of toxic or poisonous chemicals; disease organisms; radiation or radioactivity; or explosion or fire. WMD agents are classified by the acronym CBRNE (Chemical, Biological, Radiological, Nuclear, and Explosive).

At least two crucial characteristics distinguish these hazards from other types of terrorist tools. First, in the case of chemical, biological, and radioactive agents, their presence may not be immediately apparent, making it difficult to determine when and where they have been released, who has been exposed, and what danger is present for first responders and medical professionals. Second, although there is a sizable body of research on battlefield exposures to WMD agents, there is limited scientific understanding of how these agents affect civilian populations.

a. Chemical

Chemical agents are poisonous vapors, aerosols, liquids and solids that have toxic effects on people, animals or plants. Chemical agents used by terrorists are intended to kill, seriously injure, or incapacitate people through physiological effects. Hazardous chemicals, including industrial chemicals and agents, can be introduced via aerosol devices (e.g., munitions, sprayers, or aerosol generators), breaking containers, or covert dissemination. They can be released by bombs or sprayed from aircraft, boats, and vehicles. They can be used as a liquid to create a hazard to people and the environment. Such an attack might involve the release of a chemical warfare agent, such as a nerve or blister agent or an industrial chemical, which may have serious consequences.

A chemical attack could come without warning. They can have an immediate effect (a few seconds to a few minutes) or a delayed effect (2 to 48 hours). Some chemical agents may be odorless and tasteless. Signs of a chemical release include people having difficulty breathing; experiencing eye irritation; losing coordination; becoming nauseated; or having a burning sensation in the nose, throat, and lungs. Also, the presence of many dead insects or birds may indicate a chemical agent release. Some indicators of the possible use of chemical agents are listed in Table 19.

Early on in an investigation, it may not be apparent whether an outbreak was caused by an infectious agent or a hazardous chemical; however, most chemical attacks will be localized, and their effects will be evident within a few minutes. There are both persistent and non-persistent chemical agents. Persistent agents remain in the affected area for hours, days, or weeks. Non-persistent agents have high evaporation rates, are lighter than air, and disperse rapidly, thereby losing their ability to cause casualties after 10 to 15 minutes, although they may be more persistent in small, unventilated areas. While potentially lethal, chemical agents are difficult to deliver in lethal concentrations. Outdoors, the agents often dissipate rapidly. Chemical agents also are difficult to produce.

A terrorist incident involving a chemical agent will demand an immediate reaction from emergency responders—fire departments, police, hazardous materials (HazMat) teams, emergency medical services (EMS), and emergency room staff—who must have adequate training and equipment.

Table 19: General Indicators of Possible Chemical Agent Use

<ul style="list-style-type: none">• Stated Threat to Release a Chemical Agent
<ul style="list-style-type: none">• Unusual Occurrence of Dead or Dying Animals<ul style="list-style-type: none">○ For example, lack of insects, dead birds
<ul style="list-style-type: none">• Unexplained Casualties<ul style="list-style-type: none">○ Multiple victims○ Surge of similar 911 calls○ Serious illnesses○ Nausea, disorientation, difficulty breathing, or convulsions○ Definite casualty patterns
<ul style="list-style-type: none">• Unusual Liquid, Spray, Vapor, or Powder<ul style="list-style-type: none">○ Droplets, oily film○ Unexplained odor○ Low-lying clouds/fog unrelated to weather
<ul style="list-style-type: none">• Suspicious Devices, Packages, or Letters<ul style="list-style-type: none">○ Unusual metal debris○ Abandoned spray devices○ Unexplained munitions

b. Biological

Biological agents are organisms or toxins that can kill or incapacitate people, livestock and crops. A biological attack is the deliberate release of germs or other biological substances that can make people sick.

The three basic groups of biological agents that would likely be used as weapons are bacteria, viruses, and toxins. Most biological agents are difficult to grow and maintain. Many break down quickly when exposed to sunlight and other environmental factors, while others, such as anthrax spores, are very long lived. Biological agents can be dispersed by spraying them into the air, by infecting animals that carry the disease to humans and by contaminating food and water. Delivery methods include:

- **Aerosols** - biological agents are dispersed into the air, forming a fine mist that may drift for miles. Inhaling the agent may cause disease in people or animals.
- **Animals** - some diseases are spread by insects and animals, such as fleas, mice, flies, mosquitoes, and livestock.
- **Food and water contamination** - some pathogenic organisms and toxins may persist in food and water supplies. Most microbes can be killed, and toxins deactivated, by cooking food and boiling water. Most microbes are killed by boiling water for one minute, but some require longer. Follow proper instructions.
- **Person-to-person** - the spread of a few infectious agents is also possible. Humans have been the source of infection for smallpox, plague, and Lassa viruses.

Specific information on biological agents is available through the Centers for Disease Control and Prevention (CDC).

Recognition of a biological hazard can occur through several methods, including identification of a credible threat, discovery of bioterrorism evidence (devices, agent, clandestine lab), diagnosis (identification of a disease caused by an agent identified as a possible bioterrorism agent), and detection (gathering and interpretation of public health surveillance data).

When people are exposed to a pathogen such as anthrax or smallpox, they may not know that they have been exposed, and those who are infected, or subsequently become infected, may not feel sick for some time. This delay between exposure and onset of illness, the incubation period, is characteristic of infectious diseases. The incubation period may range from several hours to a few weeks, depending on the exposure and pathogen. Unlike acute incidents involving explosives or some hazardous chemicals, initial detection and response to a biological attack on civilians are likely to be made by direct patient care providers and the public health community.

Terrorists could also employ a biological agent that would affect agricultural commodities over a large area (e.g., wheat rust or a virus affecting livestock), potentially devastating the local or even national economy.

Responders should be familiar with the characteristics of the biological agents of greatest concern for use in a bioterrorism event. Unlike victims of exposure to chemical or radiological agents, victims of biological agent attack may serve as carriers of the

disease with the capability of infecting others (e.g., smallpox, plague). Some indicators of a biological attack are given in Table 20.

Table 20: General Indicators of Possible Biological Agent Use

• Stated Threat to Release a Biological Agent
• Unusual Occurrence of Dead or Dying Animals
• Unusual Casualties <ul style="list-style-type: none">○ Unusual illness for region/area○ Definite pattern inconsistent with natural disease
• Unusual Liquid, Spray, Vapor, or Powder <ul style="list-style-type: none">○ Spraying; suspicious devices, packages, or letters

c. Radiological

The use of a Radiological Dispersion Device (RDD)—often called ‘dirty nuke’ or ‘dirty bomb’—by terrorists, is considered far more likely than use of a nuclear explosive device. An RDD combines a conventional explosive device such as a bomb with radioactive material. It is designed to scatter dangerous and sub-lethal amounts of radioactive material over a general area. RDDs appeal to terrorists because they require limited technical knowledge to build and deploy compared to a nuclear device. Also, the radioactive materials in RDDs are widely used in medicine, agriculture, industry, and research, and are easier to obtain than weapons-grade uranium or plutonium.

The primary purpose of the use of an RDD is to cause psychological fear and economic disruption. Some devices could cause fatalities from exposure to radioactive materials. Depending on the speed at which the area of the RDD detonation is evacuated or how successful people are at sheltering-in-place, the number of deaths and injuries from an RDD might not be substantially greater than from a conventional bomb explosion.

The size of the affected area and the level of destruction caused by an RDD would depend on the sophistication and size of the conventional bomb, the type of radioactive material used the quality and quantity of the radioactive material, and the local meteorological conditions - primarily wind and precipitation. The area affected could be placed off-limits to the public for several months during cleanup efforts.

d. Nuclear

A nuclear blast is an explosion with intense light and heat, a damaging pressure wave, and widespread radioactive material that can contaminate the air, water, and ground surfaces for miles around. A nuclear device can range from a weapon carried by an intercontinental missile launched by a hostile nation or terrorist organization, to a small portable nuclear device transported by an individual. All nuclear devices cause deadly effects when exploded, including blinding light, intense heat (thermal radiation), initial nuclear radiation, blast, fires started by the heat pulse and secondary fires caused by the destruction.

The nuclear threat present during the Cold War has diminished; however, the possibility remains that a terrorist could obtain access to a nuclear weapon. Called improvised nuclear devices (IND), these are generally smaller, less powerful weapons than we traditionally envision.

- **Air Burst** - An air burst, by definition, is when a nuclear weapon is detonated and the fireball does not touch the surface of the earth. Usually, the weapon is set to detonate at a height of between 5,000 and 15,000 feet. Air bursts are generally selected for their capability to generate high over-pressure and shock effect over large areas, as well as to ignite fires for great distances. Neither radiation nor radioactive fallout is considered to be a significant factor in the event of an air burst.
- **Surface Burst** - A nuclear detonation is considered to be a surface burst when the fireball generated touches the surface of the earth. Surface bursts could include water bursts, underwater bursts, and underground bursts. Surface bursts produce large amounts of radioactive fallout. Therefore, some targets may be selected not only to destroy facilities but also to use the downwind fallout to prevent access or restrict movement in large geographical areas. The detonation of a nuclear bomb can produce various damaging effects. Included are blast and over-pressure, intense heat and light, nuclear radiation (fission and fusion), electromagnetic pulse, and for surface bursts, radioactive fallout.
- **Blast** - When a weapon is detonated, a tremendous pressure is developed, called the blast. This over-pressure rapidly expands outward in all directions, creating extremely high winds. The expansion continues until the over-pressure is reduced to normal pressure. The rapid outward expansion of air creates a vacuum which must equalize. The winds then reverse to the opposite direction and continue until the air pressure is equalized. Damage and injury are caused not only by the outward expansion phase of the wind and pressure but also in

the opposite direction when the air is rushing back to fill the vacuum. It is believed that an ordinary California home would be destroyed at about 1.5 to 2 psi, often 2 to 5 miles from the detonation.

- **Thermal Radiation** - Thermal radiation is a burst of intense light and heat. This phenomenon can initiate fires as well as produce casualties. A one-megaton explosion can produce flash-blindness up to 13 miles on a clear day, or 53 miles on a clear night. Thermal radiation can cause skin and retinal burns many miles from the point of detonation. A one-megaton explosion can cause first-degree burns at distances of approximately 7 miles, second-degree burns at approximately 6 miles, and third-degree burns at approximately 5 miles from ground zero. The detonation of a single thermonuclear weapon could cause many thousands of burn casualties.
- **Initial Radiation** - Initial radiation is defined as the radiation emitted during the first minute after detonation, comprised of gamma rays and neutrons. For large yield weapons, the range of the initial radiation is less than that of the lethal blast and thermal radiation effects. However, with respect to small yield weapons, the initial radiation may be the lethal effect with the greatest range.
- **Fallout** - Fallout is produced by surface debris drawn into and irradiated by the fireball, then rising into the atmosphere and eventually returning to earth. When a nuclear detonation occurs, fission products and induced radioactive material from the weapon casing and debris are pulled up into the fireball and returns to earth as fallout. A source of ionizing radiation, the fallout may be deposited miles from the point of detonation and thus affect people otherwise safe from the other effects of the weapon. The radiation danger associated with fallout decreases as the radioactive material decays. Decay rates range from several minutes to several years.
- **Electromagnetic Pulse (EMP)** - An Electromagnetic Pulse is an intense electric and magnetic field that can damage unprotected electronic equipment. This effect is most pronounced in high altitude bursts (above 100,000 feet). Surface bursts typically produce significant EMP up to the 1 psi over-pressure range, while air bursts produce somewhat less. No evidence exists suggesting that EMP produces harmful effects in humans.

e. Explosive

Terrorists have frequently used explosive devices as one of their most common weapons. Explosive devices can be highly portable, using vehicles and humans as a means of transport. They are easily detonated from remote locations or by suicide bombers. Conventional bombs have been used to damage and destroy financial,

political, social, and religious institutions. Attacks have occurred in public places and on city streets with thousands of people around the world injured and killed.

Additional Terrorism Hazards

Planners also need to consider the possibility of unusual or unique types of terrorist attacks previously not considered likely. For example, prior to the World Trade Center attack on 9/11, the use of multiple commercial airliners with full fuel loads as explosive, incendiary devices in well-coordinated attacks on public and governmental targets, was not considered a likely terrorist scenario.

Although it is not realistically possible to plan for and prevent every conceivable type of terrorist attack, planners should anticipate that future terrorism attempts could range from simple, isolated attacks to complex, sophisticated, highly coordinated acts of destruction using multiple agents aimed at one or multiple targets. Therefore, the plans developed for terrorist incidents must be broad in scope yet flexible enough to deal with the unexpected. These considerations are particularly important in planning to handle the consequences of attacks using low-tech devices and delivery, assaults on public infrastructure, and cyber terrorism. In these cases, the training and experience of the responders may be more important than detailed procedures.

- **Low-Tech Devices and Delivery** - Planning for the possibility of terrorist attacks must consider the fact that explosives can be delivered by a variety of methods. Most explosive and incendiary devices used by terrorists would be expected to fall outside the definition of a WMD. Small explosive devices can be left in packages or bags in public areas for later detonation, or they can be attached directly to a suicide bomber for detonation at a time and place when and where the terrorist feels that maximum damage can be done. The relatively small size of these explosive devices and the absence of specific security measures in most areas make these types of terrorist attacks extremely difficult to prevent. Small explosive devices can also be brought onto planes, trains, or buses, within checked bags or hand carried. Larger quantities of explosive materials can be delivered to their intended target area by means of car or truck bombs.
- **Infrastructure Attacks** - Potential attacks on elements of the nation's infrastructure require protective considerations. Infrastructure protection involves proactive risk management actions taken to prevent destruction of or incapacitating damage to networks and systems that serve society, according to the 1997 report of the President's Commission on Critical Infrastructure Protection. This commission was formed in 1996 to evaluate the vulnerability to

disruption of the nation's infrastructures, including electric power, oil and natural gas, telecommunications, transportation, banking and finance, and vital government services. The commission's report, issued in October 1997, concluded, "Waiting for disaster is a dangerous strategy. Now is the time to act to protect our future."

- **Cyber Terrorism** - Cyber terrorism involves the malicious use of electronic information technology to commit or threaten to commit acts dangerous to human life, or against a nation's critical infrastructures in order to intimidate or coerce a government or civilian population to further political or social objectives. As with other critical infrastructure guidance, most cyber protection guidance focuses on security measures to protect computer systems against intrusions, denial of service attacks, and other forms of attack rather than addressing issues related to contingency and consequence management planning.

In October 2001, immediately following the terrorist events on September 11, the State of Florida created the comprehensive counter-terrorism strategy. Soon after, the Region 5 Domestic Security Task Force was formed to mobilize and deploy assistance to quickly establish an effective response organization to assist in managing terror incidents, and disasters caused by terrorism.

The City of Orlando had previously received several terrorist threats over the past decade but those threats did not materialize or were stopped before they could materialize into action. A history of threats or attacks that were thwarted before they could be carried out has been documented by Federal and State governments as well as the Central Florida Intelligence Exchange (CFIX).

The sense of security from terrorism that had once existed in the City of Orlando was shattered early in the morning on Sunday, June 12, 2016, when a gunman entered the Pulse nightclub and committed what was at the time the deadliest mass shooting in modern U.S. history. In the immediate response, members of the Orlando Police Department engaged in a three-hour standoff with the shooter. The shooter barricaded himself inside the building with several people who were taken as hostages. A Special Weapons and Tactics (SWAT) Team entered the club just after 5:00 a.m. in an attempt to rescue the hostages. Gunfire was exchanged with the gunman, and the shooter was shot dead. In the aftermath, 49 victims were confirmed dead, and 53 were hospitalized. Reports of explosives and/or suspicious devices later turned out to be false.

The City of Orlando Emergency Operations Center (EOC) was activated for 11 days following this tragedy. Personnel and supporting agencies from around the area assisted the on-scene incident command, provided public information, and coordinated support services for victims' families and next of kin. While the immediate threat has ended, the City of Orlando is still healing from the wounds, both physical and emotional, that were inflicted during this tragic incident. This type of event was unprecedented in the City of Orlando. Much of the information and analysis is still in process and will be for some time to come.

There have not been any other documented terrorist incidents in the City of Orlando, nor have there been any incidents involving the malicious use of CBRNE materials. Although several threats have occurred, they did not materialize or were stopped before they could be carried out. Nevertheless, it is essential for authorities to take all precautions and act accordingly. Due to the magnitude of damage and injury that could occur if a terrorist event were to occur, this issue should be taken into consideration when planning for disasters. Efforts should also be made to enhance training, equipment, and supplies to local emergency management, domestic security resources, and intelligence gathering, analysis, and dissemination from fusion centers.

The City of Orlando contains an abundance of potential targets, critical infrastructure, or key resources that may present a high profile or a perceived weakness that would open the location to an attack. A terrorist incident would more than likely be located in an area that is more densely populated, such as urban areas, attractions, or event venues. For the purposes of this document, and in the interest of public safety, the precise location(s) will not be discussed or listed here. However, law enforcement, emergency management, and other domestic security-focused agencies do maintain information related to their jurisdiction's critical facilities. Other facilities and locations that may be potentially threatened also conduct exercises and hold training courses for their employees and staff to help prepare for various scenarios involving terrorism or CBRNE materials.

Extent: While we can never predict what target a terrorist will choose, we do know that some factors may be used when selecting a potential target that could create a worst case scenario. Terrorists want to achieve one or more of the following:

- Produce a large number of victims and mass panic
- Attack places that have a symbolic value
- Get the greatest possible media attention

There are numerous high profile targets in the City of Orlando that, if other incidents were to take place, would produce a mass casualty incident. Local area residents, visitors, and businesses would be placed into a panic. There would also be a great deal of national and international concern due to travelers and visitors that come to the City of Orlando. Several local area institutions may represent an ideology that some terrorist organizations, both foreign and domestic, are opposed to and would consider attacking. Other events that the City of Orlando hosts throughout the year, or even on a less frequent basis, receive a great deal of attention. Preparation to help prevent terrorist activity is heightened in advance of these activities. Because of the significance of these establishments or events, any incident would create a large media response and generate continued exposure. Athletic events, parades, concerts, political rallies, or other mass gatherings may all have some potential for a terrorist event.

Probability: Despite a recently recorded instance in 2016, the overall probability of recurrence in the City of Orlando is low. This may be attributable in part to the continued intelligence analysis and information sharing by law enforcement agencies at the local, state, and federal levels. Another factor may be the result of heightened public awareness and a mentality in which it is important to engage in the idea of "See Something, Say Something." This situational awareness is critical to help keep the number of occurrences low. However, with the number of potential targets, locations, and/or events that take place in the City of Orlando, the potential for a terrorist incident to occur again remains high. Based on this, the overall probability for a terrorist event to happen is a moderate likelihood; the City of Orlando constantly prepares for such events.

Impacts: The impacts of a terrorist event would potentially be severe in terms of loss of life, property, and economic impact. Based on information from the nightclub shooting in 2016, there was an enormous loss of life and resulting injuries. The physical building itself was severely damaged, both inside and out. Other nearby buildings and vehicles were inflicted with minor damage as well. The long-term economic impacts cannot be measured at this time. During the days following the shooting though, several surrounding businesses were closed for business. Traffic along Orange Avenue, a major thoroughfare in the City of Orlando, was re-routed around the incident as investigators conducted their forensic review at the scene. Local area hospitals were effectively shut down as they immediately responded to the rapid influx of patients to the emergency room. Other impacts on the surrounding communities, including psychological and mental health impacts, cannot be measured. In some sense, the community did band together with an immediate outpouring of support to the families and friends of victims, survivors, and others that were affected.

by this tragedy. We are still in the process of gathering information related to the measurable impacts for this single incident.

The following discussion is based on some of the scenarios that have been developed through the county-wide and regional exercise program. This includes exercises where the City of Orlando and Orange County have participated in discussion or performance-based exercises. They may also have acted as part of the Regional Domestic Security Task Force (RDSTF) or the Urban Area Security Initiative (UASI) as many of the scenarios involve a multi-agency, multijurisdictional response.

In the various exercise scenarios, casualties could be great in numbers. Estimates range anywhere from just a few individuals to hundreds in human injuries and deaths. A terrorist event does not have to injure or kill anyone, but the use of CBRNE materials, or even conventional weapons, almost guarantees that there would be victims, either from bystanders, responders, or even the terrorists themselves. Property impacts may also reach catastrophic losses depending on the location of the incident or if CBRNE materials are used. Anticipated damages to buildings, vehicles, or other property could be minimal with a cost of just a few thousand dollars or quite extensive where destruction could total hundreds of millions of dollars.

The geographic area of a terrorist incident is generally isolated in spatial components. In the City of Orlando, potential targets are spread out around areas with higher population concentrations, attractions, and event venues. An incident involving CBRNE components would certainly extend the affected area. Depending upon the type of incident, its potential target, and/or the device(s) used, there may also be some environmental impacts associated with terrorism. CBRNE devices would certainly have cascading effects on the environment, but the range of damage would vary. The target itself may contribute to harm, especially for some of the critical infrastructures related to electric and water utilities.

Economic impacts could also range from minor disruptions in critical infrastructure and services to large-scale outages and shutdowns. Terrorist attacks that concentrated on utility services or other such infrastructure would create more severe interruptions for that sector. Businesses and industry could also be severely impacted; incidents at local attractions or theme parks would affect the local tourism economy, which brings in an estimated \$57 billion in annual revenue according to the Orlando/Orange UASI Threat and Hazard Identification and Risk Assessment (THIRA) from 2012. Depending on the location, materials used, and severity of the attack, other infrastructures such as transportation networks, hospitals/healthcare facilities, and educational facilities would also be affected as a result of a terrorist incident.

Government services might also be placed under strict security following a terrorist attack. The time to recover from such an incident would vary greatly; some sectors may be more affected than other following an incident, but nearly all would experience a disruption.

Mitigation Measures: Mitigation measures for terrorism are fairly robust due to the high potential of an incident occurring in the City of Orlando. Several specific emergency plans deal with terrorism, including the City of Orlando CEMP, THIRA, and other plans developed in conjunction with local law enforcement in Orange County, as well as the region, state, and nation. The local fusion center, the Central Florida Intelligence Exchange (CFIX) continuously distributes information and analysis to recognized partnering agencies and vetted individuals. Training courses and exercise opportunities are also common with at least annual scenarios that contain an element of potential terrorist activity. This hazard is included as part of the local, regional, and state Training and Exercise Plan (TEP). There are also dedicated equipment, teams, and support resources dedicated to addressing possible terrorist plots, investigating potential leads, and continuous evaluation(s) of likely targets, critical infrastructure, and key resources. While these mitigation measures may not fully prevent other terrorist events or stop all activities before their execution, they do serve to lessen the effects an incident may have by providing a wide range of actions to mitigate the impacts and affected people, property, economy, and environment.

Vulnerability: Given that the City of Orlando is a major tourist destination with international prominence, a terrorist attack could have serious implications for life and property as well as the long-term economic well-being of the City. As a result, the City of Orlando remains vulnerable to the hazard of terrorism. The number of potential targets in the City of Orlando with its attractions, event venues, and critical infrastructure is the main reason this hazard is included here, as well as the enormous impacts that could affect the City. Extreme loss of life, property damage, and economic and service disruptions would abound in the event of a terrorist incident, especially if another or larger magnitude type of event were to happen. In consideration of this possibility, many mitigation measures have been put into place to help prevent, prepare, or avoid an incident of this type.

Risk: Medium – 32% Despite a multitude of mitigation measures that are in place, the unpredictability of terrorist events and a large number of potential targets means that this hazard has the potential to occur again in the future. It is unknown just how near or far in the future that may be, but the risk is ever-present as was demonstrated by the recent tragedy that occurred in June 2016. Severe impacts such as loss of life,

property damage, and service disruptions would result if an event were to happen in the City of Orlando. Terrorism remains a moderate risk to which the City of Orlando is vulnerable. Several plans currently exist to address the hazard and are regularly updated. Training is conducted on a normal basis throughout the year with exercise scenarios that are created to help responders address their actions in an emergency. The specialized equipment, teams, or support takes several forms, one of which is the RDSTF, which is the culmination of several disciplines, such as law enforcement, fire/rescue, emergency medical services, emergency management, hospitals, public health, schools, and businesses. The fusion center (CFIX) provides intelligence, analysis, and information sharing to a broad range of partner agencies and individuals as well. These organizations provide a high level of support for responding to, recovering from, preparing for, and preventing terrorist incidents.

Tropical Systems

Tropical systems, such as tropical storms or hurricanes, are one of the most destructive natural hazards. They can cause considerable damage and property losses. These storms are characterized by sustained high-velocity winds circulating a moving low-pressure center. They form and develop over warm water due to atmospheric instability and have the ability to impact entire regions and can affect the lives of thousands of people, homes, and businesses. Mitigating the hazards associated with tropical cyclones is an important on-going endeavor.

Because of its subtropical location and long coastline, Florida is particularly susceptible to this hazard. Sometimes referred to as coastal storms due to their approaching pathways to Florida, the impacts can be felt farther inland as the sheer size of these storms encompasses more than just coastal communities. The greatest threats posed by a tropical system in the City of Orlando would be from high winds, rain-induced flooding, and hurricane-spawned tornadoes.

There are various degrees of tropical cyclones that may affect the state of Florida, and, more specifically, the City of Orlando and Orange County: tropical depressions, tropical storms, and hurricanes.

- **Tropical depressions** (TD/SD) are a loose grouping of storms containing large amounts of rain associated with a moving low-pressure system with a maximum of sustained winds at less than 39 mph. For the scope of this document, tropical depressions were not tracked as they are not “named storms,” although they do have a moderate rate of recurrence.
- **Tropical storms** (TS/SS) contain a similar moving low-pressure system carrying massive amounts of rain with better organization and a slight counter-

clockwise rotation or circulation with sustained winds of 39 to 73 mph. The center of the storm, or the “eye,” may be present but difficult to discern.

- **Hurricanes** (H1, H2, H3, H4, H5) have a full rotation around the low-pressure center with a distinct eye. These storms can create a variety of severe weather-related hazards, and they can dump a torrential amount of rain across a large area. Hurricanes are rated based on the Saffir-Simpson Hurricane Wind Scale, which is a 1 to 5 ranking of the hurricane’s intensity. The scale is used to provide an estimate of the wind potential and property damage expected from a hurricane landfall. Sustained wind speed is the determining factor in the scale. Table 21 provides a breakdown of the Saffir-Simpson Scale. Depending upon the category of the storm (H1, H2, H3, H4, or H5), they can also produce sustained winds anywhere from 74 to over 157 mph with even higher gusts. Other related hazards are tornadoes, lightning, and flood conditions.

Table 21: Saffir-Simpson Hurricane Wind Scale

Category	Wind Speed	Type of Damage Due to Winds
1	74-95 mph	Extremely dangerous winds will cause extensive damage: Well-constructed frame homes could sustain major roof and siding damage. Many shallowly rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks.
2	96-110 mph	Extremely dangerous winds will cause extensive damage: Well-constructed frame homes could sustain major roof and siding damage. Many shallowly rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks.
3	111-129 mph	Devastating damage will occur: Well-built framed homes may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.
4	130-156 mph	Catastrophic damage will occur: Well-built framed homes can sustain severe damage with loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted and power poles downed. Fallen trees and power poles will isolate residential areas.

Category	Wind Speed	Type of Damage Due to Winds
		Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.
5	157 mph or higher	Catastrophic damage will occur: A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months.

Source: National Hurricane Center

According to the National Oceanic and Atmospheric Administration (NOAA), from 1851 to 2013 there have been 68 tropical depressions, tropical storms, and hurricanes where the eye tracked over Orange County. There also have been storms that impacted the City of Orlando but never tracked through Orange County. These storms can affect certain portions or all of the City of Orlando based on where the storm is located. As a rule from NOAA, the northeast quadrant is the fiercest part of any storm. Tropical systems have crisscrossed Orange County with storm approaches from a variety of approaches. The City of Orlando has experienced a tropical system of some kind with varying degrees of severity and magnitude. The storm tracks in Figure J are 37 different tropical systems that have passed within 65 miles of the center of Orange County. Due to the large size of most tropical systems, the occurrences listed below in Table 22 will be those systems whose “eye” or center point of the system crossed the boundaries of Orange County.

Figure K: Tropical Systems 50 Statute Miles from Orange County, 1950-2015

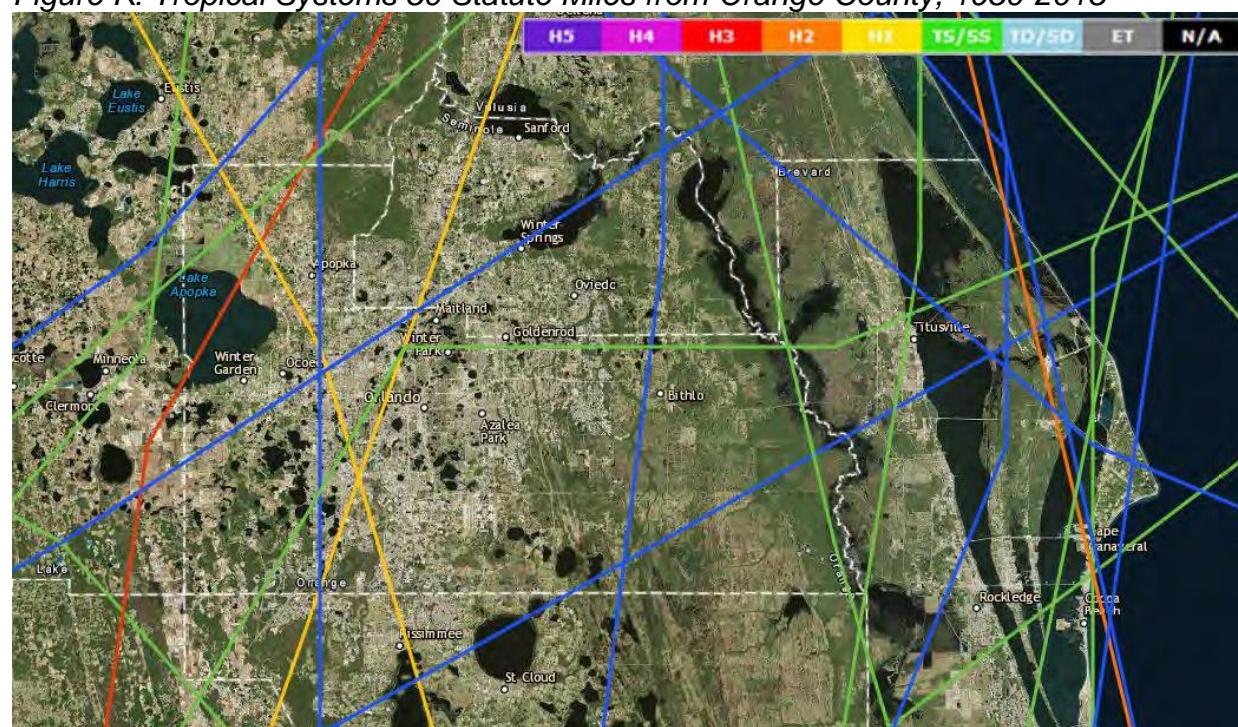


Table 22: Tropical Systems passing over Orange County, 1950-2015

Storm Name	Date of Impact	Magnitude Crossing Orange County	Greatest Magnitude of System	Area(s) of Direct Impact(s) within Orange County
Easy	09/06/1950	TS	H3	Winter Garden, Ocoee, Apopka
King	10/18/1950	H1	H3	Ocoee, Apopka
Unnamed 1959	06/18/1959	TD	H1	Unincorporated Orange County
Donna	09/11/1960	H3	H4	Apopka
Cleo	08/28/1964	TS	H5	Unincorporated Orange County
Brenda	06/19/1968	TD	H1	Unincorporated Orange County
Jenny	10/04/1969	TD	TS	Unincorporated Orange County
Subtropical 1 1974	06/25/1974	SS	SS	Unincorporated Orange County
Subtropical 3 1976	09/13/1976	TD	SS	Windermere, Ocoee, Apopka
Dennis	08/18/1981	TS	H1	Unincorporated Orange County
Gabrielle	09/14/2001	TS	H1	Bay Lake, Lake Buena Vista, Orlando, Winter Park
Henri	09/06/2003	TD	TS	Winter Garden, Ocoee, Orlando, Eatonville, Maitland
Charley	08/14/2004	H1	H4	Lake Buena Vista, Orlando, Eatonville

Source: NOAA, Historical Hurricane Tracks

Figure K shows the tracks of all the storms where the eye of the storm entered into the Central Florida region. The scale is as follows:

- Tracks in “**Red**” are Category 3 Hurricanes
- Tracks in “**Yellow**” are Category 1 Hurricanes
- Tracks in “**Green**” are Tropical Storms
- Tracks in “**Blue**” are Tropical Depressions

Figure L: Storm Track History for the City of Orlando



Extent: Many types of tropical systems have passed through the City of Orlando with differing levels of severity and magnitude. While a few Category 4 storms are the highest magnitude hurricanes to have passed by the City of Orlando and Orange County, no direct hits higher than a Category 3 has been experienced by the City of Orlando. With this in mind, the likelihood for the extent of a hurricane would be from a tropical storm up to a Category 3. More severe storms are less frequent. However, the worst-case scenario for a hurricane that could be experienced in the City of Orlando could be high as a Category 5, but this is not likely due to the inland, non-coastal geographic location of the City. Hurricane force winds tend to die down just after they experience a landfall.

Probability: The vast majority of Atlantic Ocean tropical cyclones occur during the period from June 1 to November 30 each year, also known as ‘Hurricane Season’. Through data collected from the National Oceanic and Atmospheric Administration’s (NOAA) National Hurricane Center, probabilities were created for the estimated return periods of hurricanes to coastal regions of Florida based upon their storm category. Since the City of Orlando is an inland city, it may be assumed that each storm that hits the coast will probably decrease in its intensity before reaching Clay County, thereby making the estimated return period slightly lower.

The probability of a hurricane impacting the City of Orlando sometime in the future, either directly or indirectly, is a near certainty. The Florida peninsula has historically received the highest number of tropical system activity in the nation. The category of a storm or its pathway for a strike is not as well-known and is contingent upon several factors. The return rates for weaker systems such as tropical depressions and tropical storms are more frequent. The return period for a Category 1 hurricane is a 10- to 11-year event (or about 10-11% each year), whereas a Category 5 is a 220- to 340-year event (0.29 – 0.45% each year). The City of Orlando is much more likely to experience a lower category of hurricane, storm, or depression than the more severe systems.

Impacts: Impacts that have been experienced specifically by the City of Orlando have been difficult to track using databases that record weather-related disasters like SHELDUST™ or the NWS information. This is due in part to the large size of the storm and the great region and state-wide impacts, damages, and losses that are not broken down jurisdiction by jurisdiction. In addition, the events tracked by these sources do not align with the tropical systems that directly hit the City of Orlando or Orange County. SHELDUST™ estimates that there have been 11 tropical systems for Orange County with 45.9 injuries and 0.66 deaths since 1960. SHELDUS™ also measured over \$30.8 million in property damages with \$53.3 million in crop damages (adjusted to 2014 dollars) for a total of \$84.1 million.

The City of Orlando was significantly impacted by the 2004 hurricanes (Charley, Frances, and Jeanne). Hurricane Charley had the most substantial impact on the City of Orlando as the eye of the storm passed directly over Orange County. However, Hurricane Frances and Jeanne were west of Orange County, which put Orange County in the Northeast Quadrant of the storm. The approximate damage, according to the Spatial Hazard Events and Losses Database for the United States (SHELDUS™), was approximately \$433 million, with 26,700 total damaged parcels. As SHELDUS™ only calculates at the county level, and not the municipal level, specific localized data are not available for the City of Orlando. Table 23 shows the Maximum Damage Summary for Orange County based on storm category.

Table 23: Maximum Damage Summary for Orange County

Category	Tax Parcel-based Wind Damage	Census-based Wind Damage	Uninhabitable Housing Units
1	\$749.87 million	\$584.47 million	0.1% of Total Housing Units
2	\$3.70 billion	\$2.72 billion	0.6% of Total Housing Units
3	\$11.11 billion	\$7.98 billion	1.8% of Total Housing Units
4	\$30.07 billion	\$21.27 billion	4.9% of Total Housing Units
5	\$61.14 billion	\$42.54 billion	9.9% of Total Housing Units

In order to provide better information, as part of this vulnerability assessment, a probabilistic assessment using software called HAZUS-MH was used to look at likely impacts to Orange County and the City of Orlando if tropical system events of varying return periods were to occur. HAZUS-MH is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of HAZUS-MH is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

Based on the return period of the storm, HAZUS-MH calculates the number of buildings that would be impacted and their expected damage: none, minor, moderate, severe, and destruction. This analysis will also compare the 10-, 20-, 50-, 100-, and 500-year events to show the various levels of anticipated impacts related to the hazard of tropical systems for Orange County and the City of Orlando for property damages. As is to be expected, the more severe the tropical system, the more damages sustained across all building occupancy types. Due to the probabilistic nature of these figures, they have been rounded to the nearest whole numbers; for that reason, the simple arithmetic will have some discrepancies.

Table 24: HAZUS-MH for Building Damage (#), 10-year Event in Orange County

Occupancy Type	None	Minor	Moderate	Severe	Destruction
Agricultural	452	3	0	0	0
Commercial	12,415	64	0	0	0
Education	289	2	0	0	0
Government	1,081	6	0	0	0
Industrial	3,465	20	0	0	0
Religious	766	3	0	0	0
Residential	359,391	1,438	124	6	0
TOTAL	377,859	1,535	125	6	0

Source: HAZUS-MH

Table 25: HAZUS-MH for Building Damage (#), 20-year Event in Orange County

Occupancy Type	None	Minor	Moderate	Severe	Destruction
Agricultural	413	32	7	3	0
Commercial	12,186	275	17	1	0
Education	284	7	0	0	0
Government	1,060	25	2	0	0
Industrial	3,390	88	6	0	0
Religious	746	21	1	0	0
Residential	350,017	9,485	1,423	32	2
TOTAL	368,097	9,933	1,458	36	2

Source: HAZUS-MH

Table 26: HAZUS-MH for Building Damage (#), 50-year Event in Orange County

Occupancy Type	None	Minor	Moderate	Severe	Destruction
Agricultural	406	37	8	3	0
Commercial	11,010	1,205	246	17	1
Education	259	27	5	0	0
Government	960	105	21	1	0
Industrial	3,095	325	61	3	0
Religious	686	73	10	0	0
Residential	312,677	38,793	9,230	217	42
TOTAL	329,093	40,565	9,582	243	43

Source: HAZUS-MH

Table 27: HAZUS-MH for Building Damage (#), 100-year Event in Orange County

Occupancy Type	None	Minor	Moderate	Severe	Destruction
Agricultural	352	48	30	20	5
Commercial	9,773	1,744	775	179	9
Education	216	43	24	8	0
Government	820	157	85	25	0
Industrial	2,865	429	158	33	0
Religious	619	105	36	8	0
Residential	270,427	62,954	22,916	3241	1,421
TOTAL	285,073	65,479	24,023	3,515	1,435

Source: HAZUS-MH

Table 28: HAZUS-MH for Building Damage (#), 500-year Event in Orange County

Occupancy Type	None	Minor	Moderate	Severe	Destruction
Agricultural	241	95	63	44	12
Commercial	4,316	3,056	3,300	1,728	79
Education	102	69	74	46	0
Government	351	235	287	214	0
Industrial	1,245	817	880	542	2
Religious	291	228	170	80	0
Residential	131,785	124,957	79,750	17,595	6,872
TOTAL	138,331	129,457	84,524	20,247	6,966

Source: HAZUS-MH

These losses indicate that any hurricane would cause property damages of some kind to each building type. The spatial impacts from a tropical system may vary greatly depending on the type of storm that affects Orange County or the City of Orlando. However, most systems are quite large and can encompass the entire county. While impacts would generally be felt worst in the northeast quadrant of a system moving through the City of Orlando, other severe weather-related hazards would spawn from the tropical system that would extend beyond the eye of the storm.

Economic impacts and disruption of services would also be significant. Utility outages for electric, water, and sewer would be some of the more immediate issues that would result in a tropical cyclone impacting the City of Orlando. Large amounts of debris would also result from the high winds and torrential rains, which might cause utility and power lines to be down. Debris would also cut off transportation routes for first

responders getting access to incident scenes once the winds recede. Most critical infrastructure is hardened to withstand damage related to high winds and most impacts from debris, as well as elevated above the base flood elevation. Back-up generators at these facilities would help provide power to the most important assets and keep critical operations going.

Other impacts on the economy would be slower to respond to and recover from following a tropical system. Businesses and industries that cannot operate after a storm and would stay closed until normal conditions (such as electric power, utilities, and other essential services) are restored or until roadways are cleared of debris and schools are reopened. Since the storms of 2004, many businesses and industries have seen the benefits of being prepared before a storm. Grocery stores, gas stations, pharmacies, and other big-box retailers installed generators and purchased emergency supplies to keep their facilities open as soon after the system left the area. Employees at other commercial or industrial businesses that cannot open quickly enough would not be able to work, to sell their products or services, and would suffer losses in wages and income. Table 29 shows in detail the probabilistic losses that Orange County would experience for both capital stock losses and income losses for varying storm severities.

Table 29: HAZUS-MH for Incomes Losses in Orange County

Income Losses (in \$1,000s)		10-year Event	20-year Event	50-year Event	100-year Event	500-year Event
Capital Stock Losses	Building Damage	111,798	480,107	1,664,578	3,130,107	12,200,418
	Contents Damage	16,070	67,569	242,284	818,287	3,741,705
	Inventory Loss	0	95	1,441	7,077	74,768
Income Losses	Relocation Loss	2,082	17,818	83,643	355,692	1,551,433
	Capital Related Losses	0	231	7,300	21,142	161,559
	Wage Losses	0	391	27,464	72,136	416,254
	Rental Income Loss	7,523	30,687	137,347	191,298	963,313
TOTAL		137,473	596,897	2,164,057	4,595,738	19,109,451

Mitigation Measures: Tropical systems receive a good deal of focus on preparedness and mitigation actions in Florida. Hurricanes, tropical storms, and tropical depressions are addressed in emergency management plans like the City of Orlando CEMP for overall response actions. The Orange County Sheriff's Office (OCSO) maintains a Traffic and Shelter Operations Plan that is updated annually that looks at evacuation responsibilities, reverse lane operations, signage, and staffing emergency shelter; this plan would be for any evacuation for any hazard.

The City of Orlando and Orange County participate in the annual State Hurricane Exercise that takes place in May. This exercise focuses on a statewide response to a tropical system(s) scenario with multiple counties that are impacted. Also, training classes in response operations for hurricanes are an ongoing endeavor with courses in damage assessment, electronic incident management systems for resource tracking of

incidents, call center operations, and periodic review of the Emergency Operations Center protocols.

There are several teams in Orange County that have been used for hurricane response operations, such as the Citizens' Assistance Response Team (CART) and Senior Assistance Team (SAT) that utilizes fire department personnel to address resident issues following a storm system. This may include putting tarps on roofs, cutting fallen trees, and other needs for neighborhoods. Community Emergency Response Teams (CERT), which are comprised of local residents who have received additional training for emergency response, are active in neighborhoods throughout the City of Orlando. First aid, fire suppression, triage, treatment, and transport of victims are among some of the topics covered in their training.

Vulnerability: The City of Orlando has seen its share of tropical systems where the eye of the storm tracks through Orange County. The frequency of these occurrences makes the City of Orlando's population highly vulnerable to the effects of tropical systems, whether it is direct impacts or indirect consequences. The size of this hazard could encompass the entire city or county, as well as entire regions of the State.

The 2004 hurricane season saw systems like Charley, Frances, and Jeanne within just weeks of each other that stretched resources in the City of Orlando, Orange County, and across the State of Florida. Since then, neighborhoods have developed in new areas, transportation networks have expanded, and trees have grown taller; all this can increase the needs placed on emergency services during a hurricane.

The frequency of tropical systems for the most severe storms is quite low, but smaller cyclones, storms, and depressions with shorter return periods that have come through the City of Orlando can cause moderate damages as well. The potential for injuries and deaths is always present; continuous warnings and notifications to keep people out of the storm have improved over the past several years. General public awareness about the dangers these tropical systems bring with them is also getting better through events like the annual Hurricane Expo hosted by the Orange County Office of Emergency Management.

The populations that are most at risk during Category 1 and Category 2 storms are individuals with special needs or those who may be particularly vulnerable during disaster events. Key at-risk populations include people in lower-income households, marginalized racial or ethnic groups, single parents, minority-language speakers, recent migrants, tourists, the homeless, children, the elderly, and persons with disabilities. Single-parent households are consistently at risk during all five storm

categories. However, as a storm intensifies, more people will be at risk. Table 30 shows populations at risk during hurricanes based on the category of the storm.

Table 30: Population Most at Risk during Hurricanes

Category	Minority Population	Over 65	Disabled	At or Below Poverty Line	Language Isolated Households	Single Parent Household
1	61	84	290	55	27	59
2	229,595	74,805	239,001	88,729	17,705	50,895
3	280,638	89,985	286,832	106,233	19,664	61,409
4	280,638	89,985	286,832	106,233	19,664	61,409
5	280,638	89,985	286,832	106,233	19,664	61,409

The implementation of enhanced building codes for new construction has also had the benefit of mitigating against more serious impacts on property. As the severity of the storm increases, though, more property damage is likely to occur through wind-borne debris to other nonstructural property. Other impacts on the economy and disruption of services would also be contingent upon storm severity, but most critical infrastructure is equipped to handle the more frequent types of tropical systems we see.

Risk: High – 67% The overall risk to from tropical systems is categorized as a high threat mainly because of the significant impacts this hazard poses to humans, structures and property, the geographic area, and the disruption to the local economy and services. Also, there is a high probability for a tropical cyclone to affect the City of Orlando. The mitigation measures that are currently in place can help reduce recovery times, but this hazard will still occur. Hurricanes are slightly more predictable than other forms of severe weather, but hurricane prediction is not an exact science. While impacts can be reduced through better detection technology, public outreach, and emergency notification systems, it is incumbent upon responders to continue to plan, train, exercise, and equip themselves in preparation for an incident.

Tropical systems are the most well-known of the hazards experienced in the City of Orlando, and public awareness of this hazard is on the rise, especially among

residents that are new to the area or Florida in general. Emergency management officials in the City of Orlando and Orange County have distributed NOAA weather radios for the past several years and plan to continue to do so to help residents receive important warnings when severe weather happens. The NWS and other media outlets now have improved their modeling capabilities for storm tracks and will continue to issue watches, warnings, and other weather advisories.

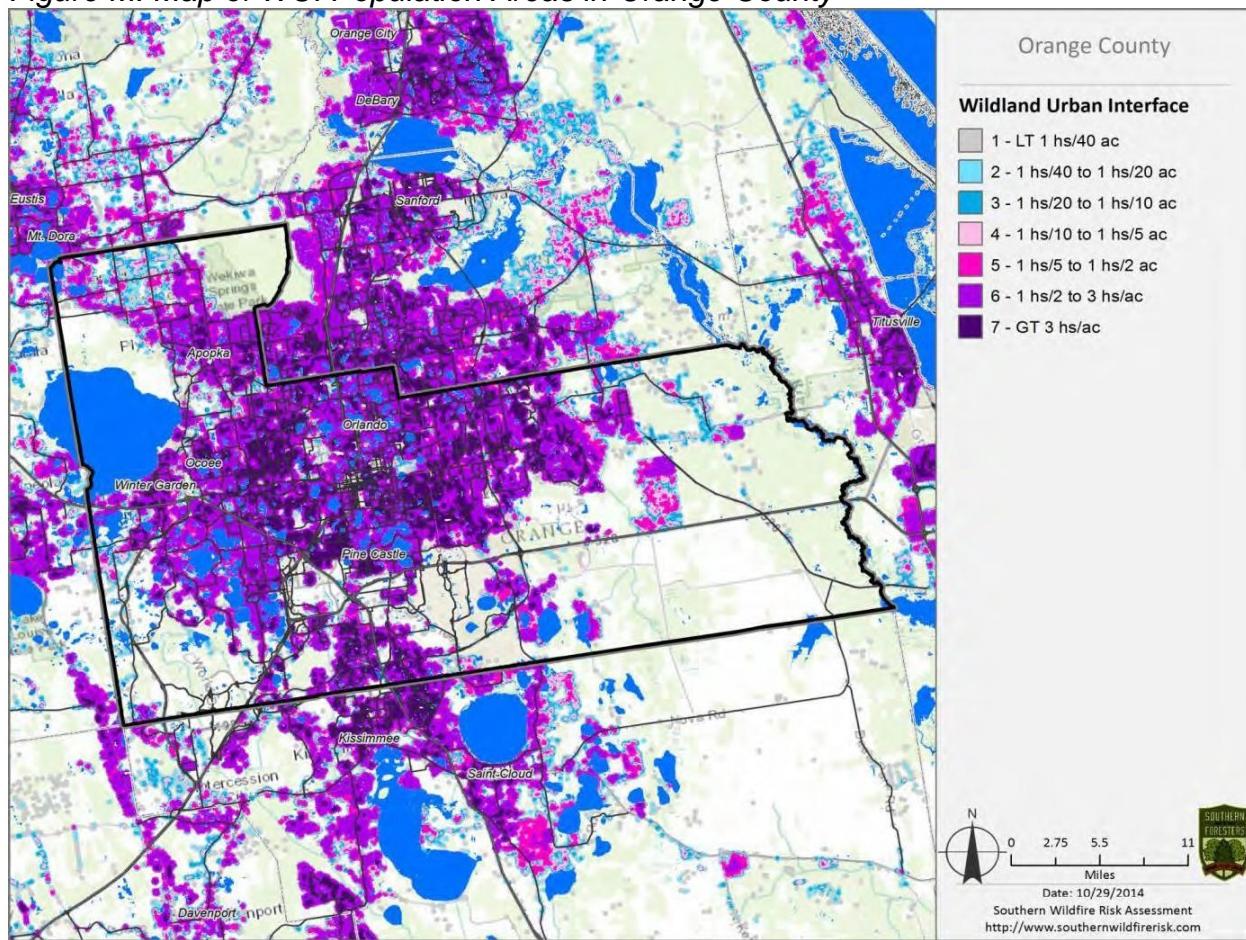
Wildfires

The typical fire season is from January through May each year. The City of Orlando's continuing growth of the Wildland/Urban Interface is an issue, specifically in the southeast quadrant of the City. The State of Florida defines a Wildland/Urban Interface as the geographical point where two diverse systems (wildland and urban) meet, and affect each other, and give rise to conflicts. Wildland fires are particularly hazardous in more undeveloped portions of the City of Orlando. The Florida Forest Service has identified several problem areas, making the vulnerability high. The southeast quadrants of the City of Orlando are more vulnerable to this hazard and have the highest potential for impact based on their location.

In the past ten years, the City of Orlando Fire Department and other county and municipal fire departments have responded to support operations in thousands of wildland fires. Fortunately, only a small percentage of these incidents were significant enough to involve additional agencies and organizations. Following wildfire incidents between southern Volusia and southeast Orange County in April and May of 2009, the Orlando-Volusia Wildfire Complex was established to assist with battling the blazes, which included over 40 wildfires and burned over 8,000 acres.

Wildland fires can result in injuries and deaths of both citizens and firefighters, and result in thousands or millions of dollars in property damage. Government services, businesses, and critical infrastructure/processes may all be disrupted by wildfires. The geographical extent and duration of the disruption depend on the extent of the fire, obstacles, and number of fires. However, as a wildland fire event is unlikely to affect the entirety of the City of Orlando and its operations all at once, the impact severity is therefore rated as medium.

Figure M: Map of WUI Population Areas in Orange County



Source: SouthWRAP Summary Report, 2014

Geographical Information

Geographic Location and Topography

The City of Orlando is located in the central portion of Orange County and is situated approximately midway between the East and West coasts of the state. It is the county seat and the largest municipality within Orange County. The urban activity associated with and surrounding Orlando defines the central urban core of Orange County. Maitland to the north, Apopka to the northwest and Winter Garden and Ocoee to the west of Orlando, comprise the significantly sized municipalities in Orange County, which are not contiguous to Orlando.

The City of Orlando covers an area of approximately 118 square miles or 75,520 acres with a current population of around 280,000. There are 43,338 residents within a 1,720-acre radius of the downtown district. The daytime population is estimated at 149,298. Downtown Orlando is headquarters for government operations for the City of Orlando, Orange County, and regional offices for federal and state government due to its proximity to the region's top business and government leadership, consulates, international trade organizations, and professional associations.

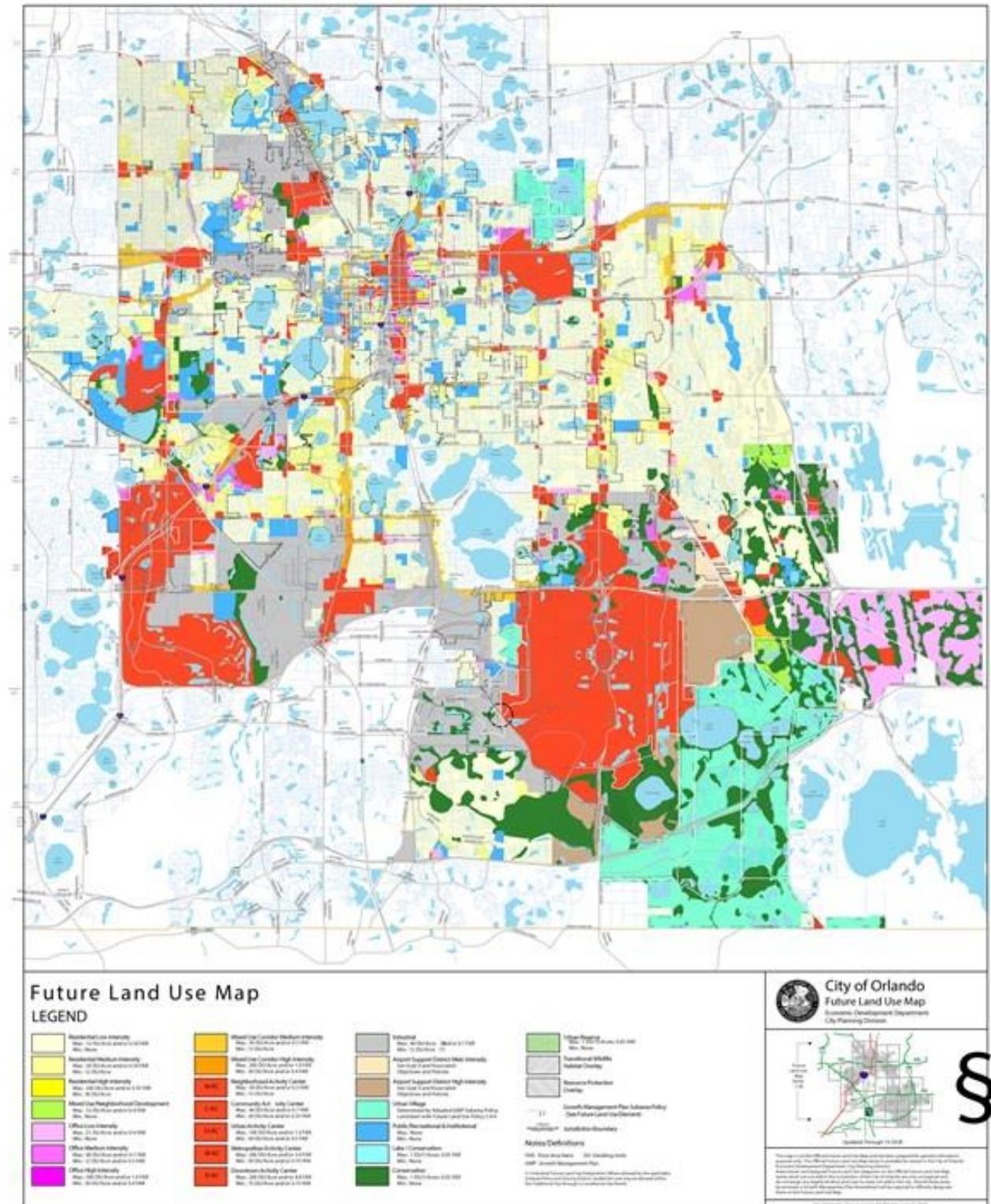
The City of Orlando's climate reflects its location in Florida at the interface of a temperate and subtropical environment. Average summer temperatures are about 82°F, and average winter temperatures are about 62°F. In winter, temperatures may drop at night to near or below freezing but usually rise rapidly during the day to the 60°F range. Cold spells can be expected about six times during an average winter. Rain and winds usually precede these cold spells but they normally influence local conditions only for a few days before temperatures rise again.

The rainy season extends from June to September (but sometimes through October when tropical storms are nearby). During this period, scattered afternoon thundershowers take place almost daily. These storms occur on an average of 90 days per year, mostly during the afternoon and evening hours. Heavy rains associated with these thunderstorms often causes localized flooding problems. Average yearly precipitation for the area is 55 inches.

The topography of the City of Orlando is typical of Central Florida, flat and nondescript, composed mostly of natural wetlands, having numerous lakes and swamp areas. The average elevation of the City is 82 feet above sea level.

Land Use Patterns

Figure N: Future Land Use Map for the City of Orlando



Water Area and Drainage Patterns

A major drainage basin divide passing through the center of the Orlando area separates the watershed for the south-flowing Kissimmee River from the north-flowing St. Johns River. Six tributaries to the two rivers have headwaters near the City of Orlando. The Shingle Creek, Boggy Creek, and Lake Hart sub-basins discharge into the Kissimmee River. Howell Branch Creek, the Little Wekiwa, and portions of the Little Econlockhatchee sub-basin discharge into the St. Johns River.

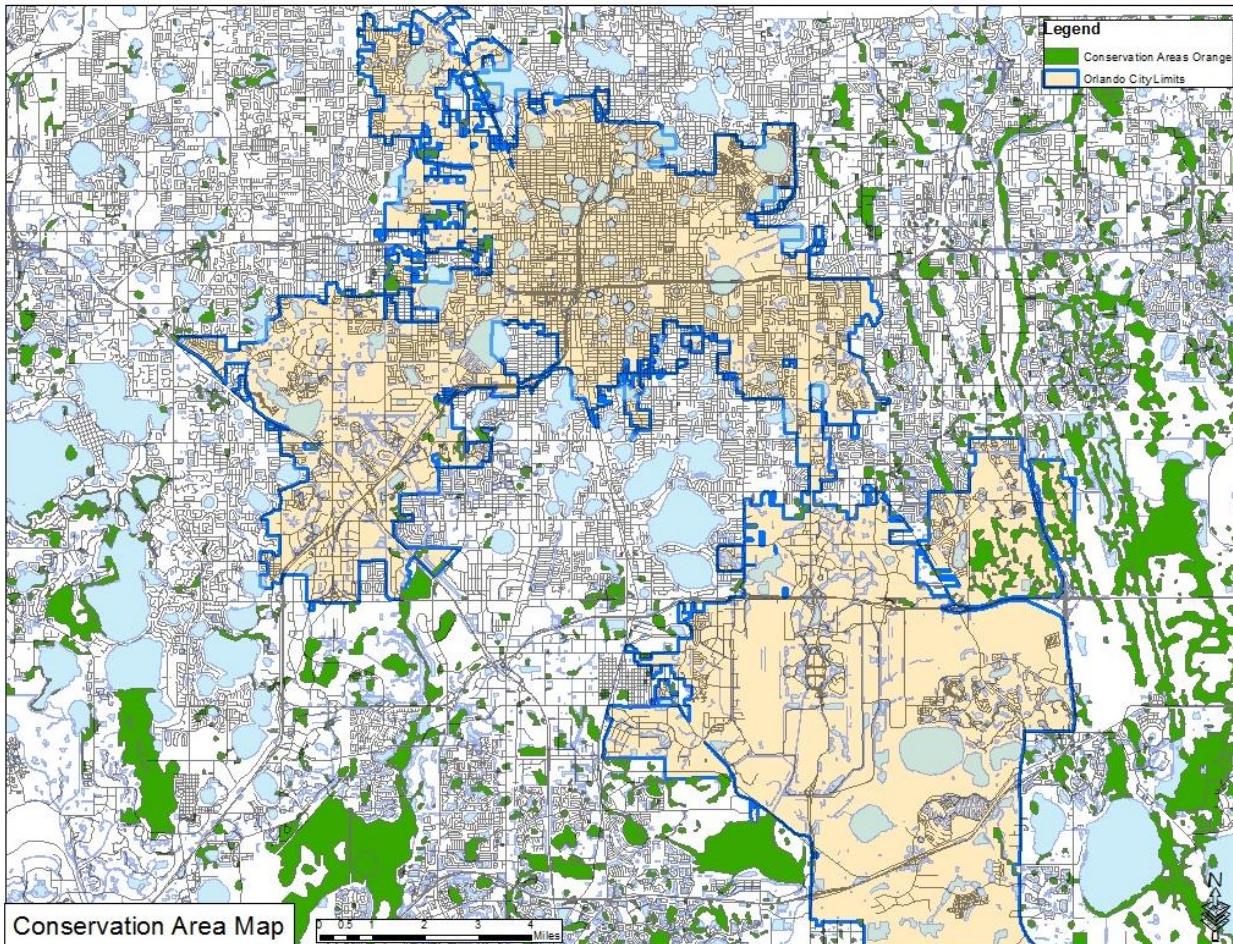
Most stream channels through the Orlando area have been severely altered to improve drainage through channelization, culverts, and clearing of stream bank vegetation. Flow in many stream reaches is derived primarily from groundwater flow, urban stormwater runoff, and artificially controlled lake discharges. Numerous canals have been constructed throughout the Orlando area to improve drainage, to control lake levels, and to mitigate flood hazard potential. Water quality of lakes and streams is generally degraded due to nutrient pollution and turbidity problems attributable to urban stormwater runoff.

Stormwater runoff from developed portions of the Orlando area presents a major flood hazard as well as a primary source of water pollutants to the surface and groundwater systems. Solutions to specific stormwater and water quality management problems require coordinated efforts designed to both reduce the volume of stormwater runoff as well as eliminate non-point sources of water pollution. Measures to address this problem include use of the storage and dispersal features of the natural drainage system, combined with runoff and erosion control measures designed to minimize sedimentation potential.

Environmentally Sensitive Areas

The City of Orlando has identified locations of environmentally sensitive areas. These sensitive areas are instrumental in providing fish and wildlife habitats, protecting water quality, preventing erosion, storing water, and providing flood control. Over the years as development has spread, a natural division and designation of urban and rural wetlands have occurred. Figure O shows locations of the conservation sites within the City of Orlando.

Figure O: Conservation Sites within the City of Orlando



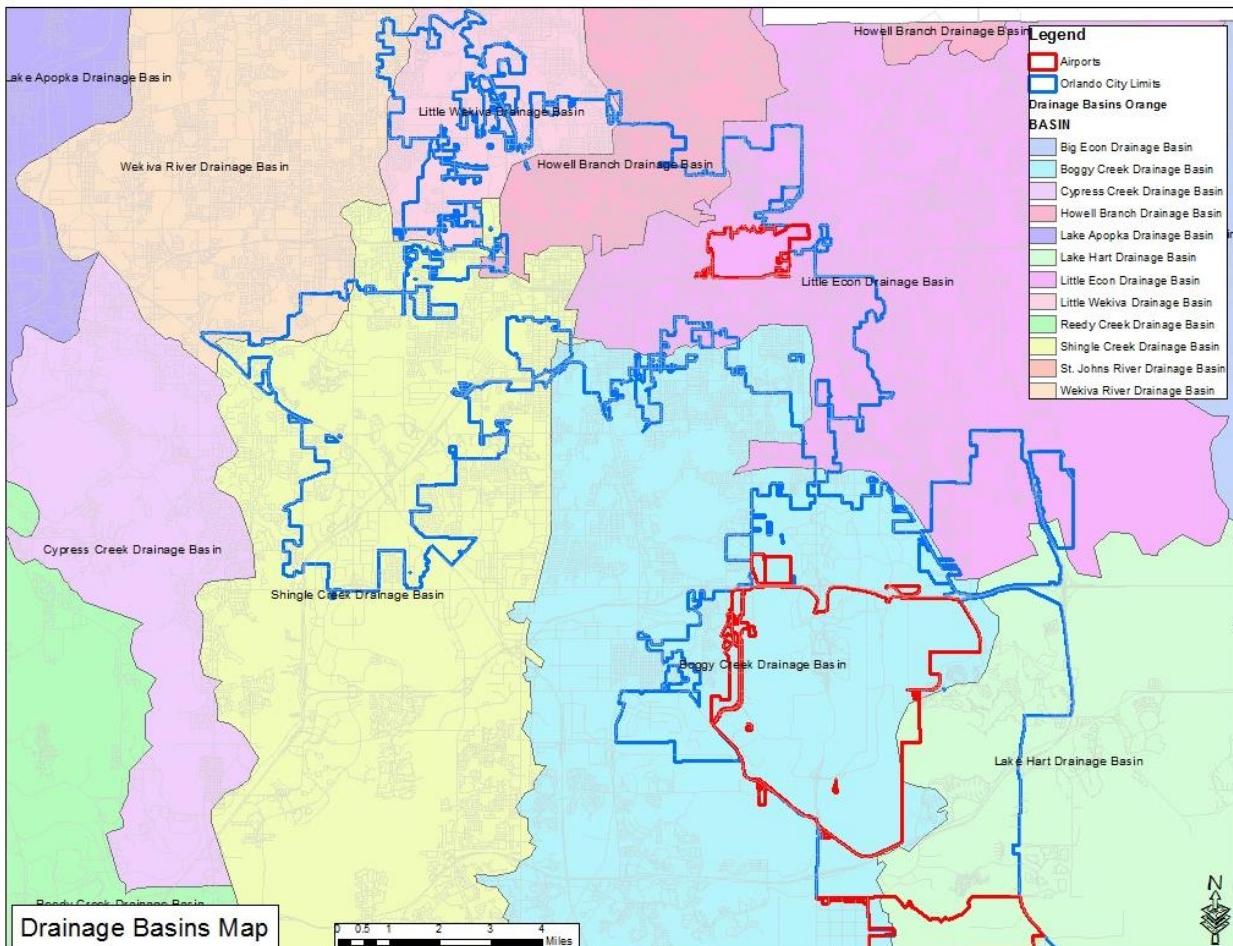
Flood Prone Areas

There are approximately 120 lakes located in the Orlando planning area, ranging in size from less than two acres to over 350 acres. The majority are natural, formed in sinkholes resulting from the solution of underlying limestone bedrock. For descriptive purposes, four types of lakes have been identified, including: (1) lakes having inflowing streams, (2) lakes having outflowing streams, (3) lakes having both inflowing and outflowing streams, and (4) landlocked lakes. Approximately 75% of the lakes in the planning area are land-locked in their natural state.

The floodplains of the City of Orlando consist of lowlands adjacent to the streams and lakes. The City of Orlando currently uses the Federal Emergency Management Agency's Flood Insurance Rate Maps (FIRM) to determine flooding hazards and impacts.

The FIRMs and D-FIRM maps use historic, meteorological, and hydraulic data as well as open-space conditions, flood-control works, and development to show areas that are prone to flooding. Figure P shows a map of the major basins in the City of Orlando.

Figure P: Major Drainage Basins in the City of Orlando



Demographic Profile

According to the U.S. Census Bureau American Community Survey (ACS) of 2017, the City of Orlando's population was 280,258 up nearly 41,958 from the 2010 population of 238,300. According to the 2017 ACS, approximately 77.8% of the City of Orlando's population is over the age of 18, and 10.5% is 65 years and over. The median age of the City of Orlando residents is 33.3 years.

Table 31: Population by Age

Age Group	Estimate	Percent
Total Population	280,258	100.0%
Persons under 5 years	20,689	7.4%
Persons 5-9 years	16,951	6.0%
Persons 10-14 years	16,216	5.8%
Persons 15-19 years	13,508	4.8%
Persons 20-24 years	21,644	7.7%
Persons 25-34 years	61,102	21.8%
Persons 35-44 years	43,003	15.3%
Persons 45-54 years	31,569	11.3%
Persons 55-59 years	15,077	5.4%
Persons 60-64 years	10,987	3.9%
Persons 65-74 years	18,144	6.5%
Persons 75-84 years	7,107	2.5%
Persons 85 and older	4,261	1.5%

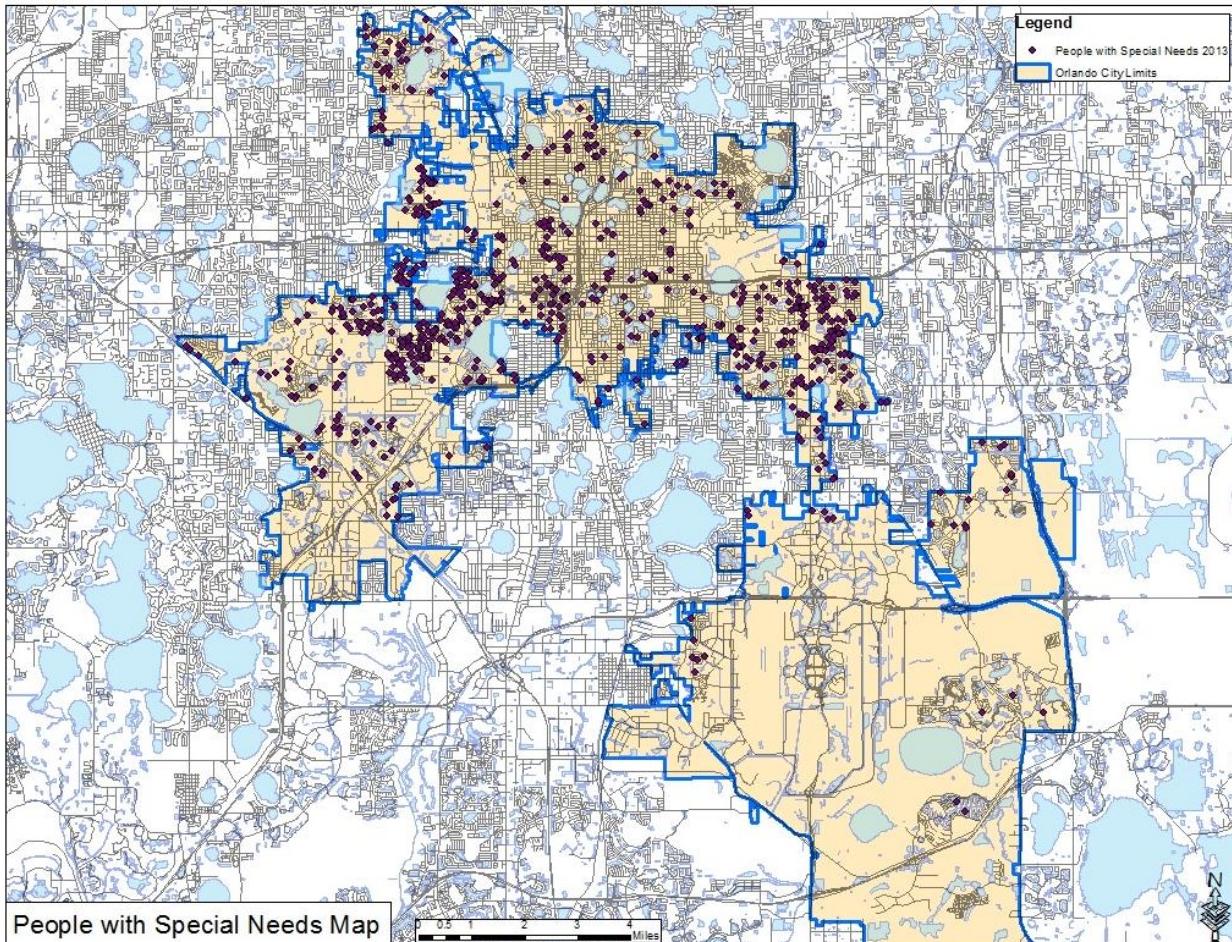
Source: US Census Bureau, 2013-2017 American Community Survey 5-Year Estimates and City of Orlando 2010-2040 Growth Projections Report

Special Medical Needs Populations

In emergency situations, Orange County considers the needs of persons requiring special medical attention and/or those having no personal transportation through the People with Special Needs Program.

As of 2018, over 510 City of Orlando residents were registered with the Orange County People with Special Needs Registry. According to the 2017 U.S. Census Bureau American Community Survey (ACS), the City of Orlando had an estimated 27,356 individuals with a disability, including hearing difficulties, physical disabilities, cognitive disabilities, and/or medical disabilities. Figure Q shows a map of persons registered with Orange County People with Special Needs program that reside in the City of Orlando.

Figure Q: Persons with Special Needs within the City of Orlando



Disabled Population

According to the 2017 US Census Bureau American Community Survey (ACS), the City of Orlando has an estimated 27,356 individuals with a disability. These individuals have various forms of disabilities including:

- Deaf and/or Hard of Hearing
- Blind and/or Visually Impaired
- Physical Disabilities
- Cognitive Disabilities
- Medical Disabilities

Table 32 shows a table with the percentage of persons with a disability who reside in the City of Orlando.

Table 32: Persons with a disability within the City of Orlando

	Estimate	Percent
Total with disability	27,479	10.3%
Population under 18 years with a disability	3,076	5.3%
Population 18 to 64 years with a disability	14,736	8.1%
Population 65 years and over with a disability	9,667	35.5%

Source: US Census Bureau, 2013-2017 American Community Survey 5-Year Estimates and City of Orlando 2010-2040 Growth Projections Report

Farmworker Populations

The Orange County Health Department licenses two permitted labor camps in Orange County, neither of which are within City of Orlando limits. In recent years, however, this has been a waning program in Orange County mainly due to weather freezes and the decline of farming.

Tourism and Seasonal Populations

In 2017, Orange County hosted 72 million visitors. Approximately, 80% of the domestic visitors were here for recreational purposes. To accommodate these visitors, Orange County has over 144,125 hotel rooms.

Non-English Speaking

The City of Orlando has a diverse minority population that speaks languages other than English. According to the U.S. Census in 2017, 65.5% spoke English as their first language, and 34.5% persons spoke a language other than English. Table 33 displays categories of the different languages spoken within the City of Orlando.

Table 33: Languages spoken within the City of Orlando

	Estimate	Speak English “very well” (%)	Speak English less than “very well” (%)
Population 5 years and over	250,297	87.0%	13.0%
Speak only English	163,983	(X)	(X)
Speak a language other than English	86,314	62.3%	37.7%
Spanish	60,498	62.4%	37.6%
5-17 years old	9,533	82.6%	17.4%
18-64 years old	45,099	62.7%	37.3%
65 years old and over	5,866	27.1%	72.9%
Other Indo-European languages	17,179	63.6%	36.4%
5-17 years old	2,816	84.9%	15.1%
18-64 years old	13,149	61.4%	38.6%
65 years old and over	1,214	38.6%	61.4%
Asian and Pacific Island languages	6,590	58.4%	41.6%
5-17 years old	882	84.2%	15.8%
18-64 years old	5,021	55.2%	44.8%
65 years old and over	687	48.3%	51.7%
Other languages	2,047	60.4%	39.6%
5-17 years old	178	86.0%	14.0%
18-64 years old	1,727	60.1%	39.9%
65 years old and over	142	31.7%	68.3%

Source: US Census Bureau, 2013-2017 American Community Survey 5-Year Estimates

Transient Population

The State of Florida defines a homeless person as an individual:

- Sleeping in a place not meant for human habitation
- Sleeping in a homeless emergency shelter

- Living in transitional housing having come into that housing from the street or a homeless emergency shelter

According to a Point in Time (PIT) Count conducted by the Central Florida Commission on Homelessness in January 2018, it is estimated that the current combined transient population in Orange, Osceola, and Seminole Counties is estimated at around 2,053 individuals. This analysis of the homeless population is largely based on a single-day count of emergency shelters, transitional housing, soup kitchens, homeless camps, food pantries, drop-in centers, and day-labor pools. According to the Health Care Center for the Homeless, there are 150 transient camps within Orange County. These are located mainly on the east side of Orange County while homeless people also tend to congregate in large cities like the City of Orlando.

Housing

According to the U.S. Census Bureau, in 2017 there were a total of 107,590 housing units in the City of Orlando. The U.S. Census Bureau reports that the average property value in 2017 was \$232,600 with the average per-capita income \$47,594. Table 34 of the 107,590 occupied housing units in Orlando in 2017, the ACS estimated that 33.4% were owner-occupied while 66.6% were renter-occupied. Table 35 shows the average income per household in the City of Orlando based on 107,590 households.

Table 34: Housing Units in the City of Orlando

Type of Housing	Number	Percentage
Occupied housing units	107,590	100.0
Owner-occupied housing units	35,916	33.4
Renter-occupied housing units	71,674	66.6

Source: 2017 Demographic Profile Data, US Census, and City of Orlando 2010-2040 Growth Projections Report

Table 35: Average Income per Household

Total Household	Estimate	Margin of Error
Total Households	107,590	X
Less than \$10,000	8,377	1.7
\$10,000 to \$14,999	5,400	1.2
\$15,000 to 24,999	13,099	1.7
\$25,000 to \$34,999	12,226	2.0
\$35,000 to \$49,999	17,787	2.0
\$50,000 to \$74,999	20,464	2.1
\$75,000 to \$99,999	9,649	1.7
\$100,000 to \$149,000	10,553	1.7
\$150,000 to \$199,999	4,468	1.0
\$200,000 or more	5,567	1.1
Median household income (dollars)	47,594	X
Mean household income (dollars)	70,027	X

Source: 2017 US Census Bureau

Manufactured Home Parks

According to the U.S. Census Bureau ACS estimates, in 2015, approximately 4% of all (20,137) occupied housing was mobile homes within the Orange County only. However, there are over 100 manufactured home parks within Orange County.

Inmate Population

The City of Orlando does not operate a correctional facility. The Orange County Jail, located off John Young Parkway in Orlando, serves as Orange County's central correctional facility. This facility is the fifth largest jail system in the State of Florida with more than 1,700 employees including over 1,000 certified correctional employees. The average daily jail population in 2016 stands at over 2,625 inmates.

Economic Profile

Industry employment affects businesses that provide goods or service demands. When considering the potential impact of being "shut down" for two weeks or more, it is important to note the change in employment, population, personal income, and gross domestic product (GDP).

Any emergency and/or disaster can have an impact on the City of Orlando's economy. Any major or catastrophic disaster could have an initial major disruption in the following sectors:

- Service occupations
- Farming, fishing, and forestry occupations
- Production, transportation, and material moving occupations

A massive hurricane could leave the City of Orlando and surrounding communities in distress for more than one month, creating even more devastating impacts.

The 2017 ACS reported that those people aged 16 years and older, 71.9% were in the labor force, which is a decrease from 2010 (down from 74.2%). The unemployment rate for the civilian labor force reported in 2017 was 3.9%, down from 10.4% in 2010. Table 36 shows employment by occupation in the City of Orlando.

Table 36: Employment by Occupations

Occupation	Average Employment
Management, business, science, and arts occupations	51,603
Service occupations	34,075
Sales and office occupations	41,787
Natural resources, construction, and maintenance occupations	10,909
Productions, transportation, and material moving occupations	13,431

Source: 2017 US Census Bureau and City of Orlando 2010-2040 Growth Projections Report

Critical Infrastructure and Emergency Management Support Facilities

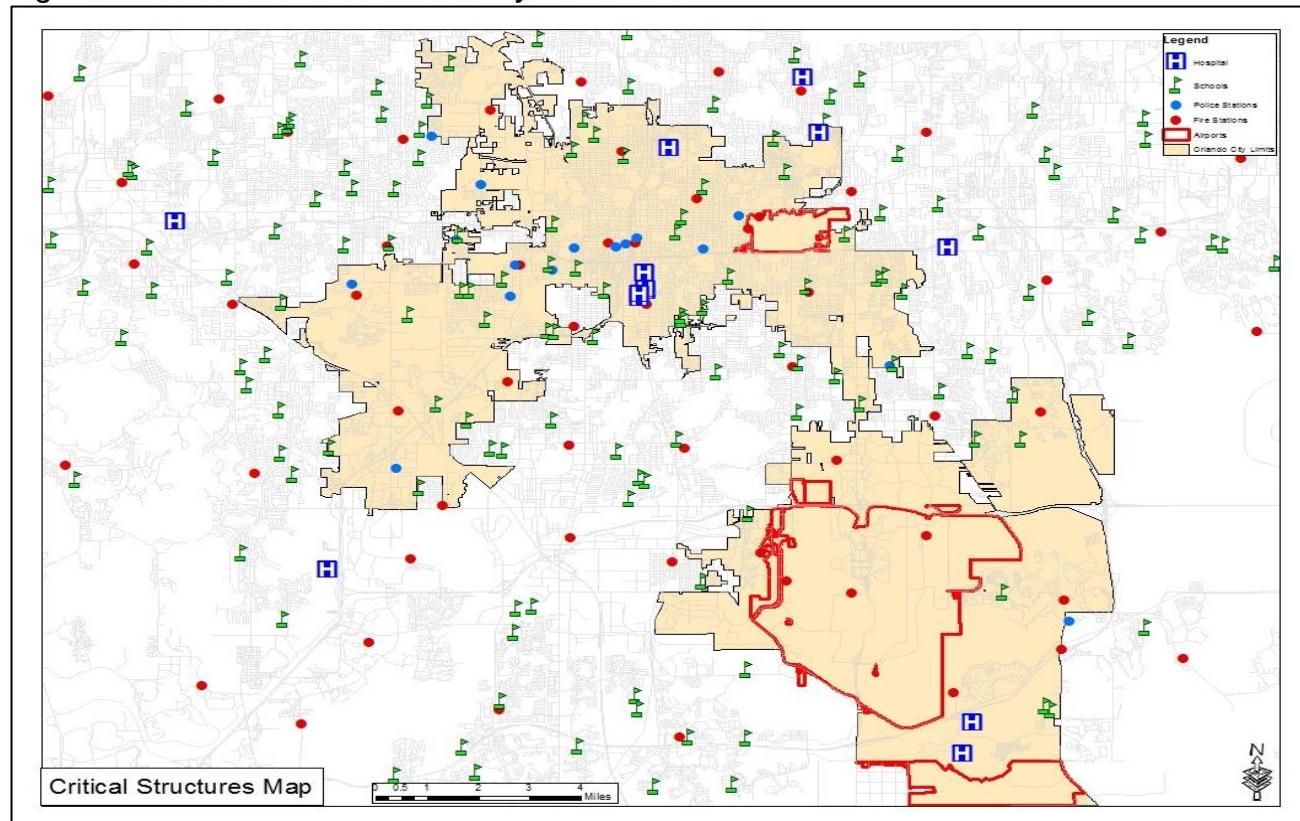
These facilities are critical prior to and following an incident to aid in the initial response and recovery of the City of Orlando. Several categories have been identified in the City of Orlando to include:

- Electric distribution system components
- Health/medical facilities
- Communications network components
- Transportation networks
- Public buildings

- Emergency services facilities
- Water distribution/drainage facilities
- Historic structures
- Landfill and debris sites
- Public/private supply centers
- Hazardous materials storage facilities
- Volunteer Reception Center
- Donations Warehouse
- County Staging Area(s)
- Pharmaceutical Points of Dispensing
- Incident Command Posts
- Disaster Consumables
- Points of Distributions

This information is often maintained and can be displayed through the City of Orlando's GIS System. The City of Orlando Office of Emergency Management coordinates the identification and support to these facilities prior to and following an emergency and/or disaster. Figure R shows a map of critical infrastructure facilities in the City of Orlando.

Figure R: Critical Facilities in the City of Orlando



Special Planning Considerations

The City of Orlando is a large metropolitan and urban city. As such there are additional special planning considerations to address.

Civil Disturbances

The City of Orlando has a multi-ethnic population originating from countries with widely divergent political cultures, religious beliefs, and educational backgrounds. As with any large metropolitan area with diverse populations, civil disturbances must be anticipated, expected, and prepared for. This type of hazard refers to riots and/or peaceful or non-peaceful protests. Any of these events can severely impact the economic well-being and the safety and security to the City of Orlando's citizens and visitors. There is always the possibility that such an event could happen in combination with another hazard that reduces available necessities, such as food and water, as in pandemics, hurricanes, or other widespread disasters. This is probable, but not likely, in the City of Orlando.

Civil disturbance is a broad term that is typically used by law enforcement to describe one or more forms of unrest caused by a group of people. Civil disturbance is typically

a symptom of, and a form of protest against, major socio-political problems. Typically, the severity of the action coincides with the level of public outrage. In addition to a form of protest against major socio-political problems, civil disturbances can also arise from large celebrations that become disorderly.

Civil disturbances can take the form of small gatherings or large groups blocking or impeding access to a building, or disrupting normal activities by generating noise and intimidating people. Demonstrations can range from a peaceful sit-in to a full-scale riot, in which a mob burns or otherwise destroys property and terrorizes individuals. Even in its more passive forms, a group that blocks roadways, sidewalks, or buildings interferes with public order. Often protests intended to be a peaceful demonstration to the public and the government can escalate into general chaos. Civil disturbances affect the following elements of society:

- **Citizens:**

The general public could serve as participants or targets in actions of civil disturbance. Wide spread unrest could cause fear amongst the populace and cause them to be absent from school or work activities. During an event, bystanders may be harmed because of the activities of participants.

- **Responders:**

Responses to civil disturbance events are generally handled at the local level. However, in a large-scale event, the resources of the City of Orlando and Orange County may be exceeded. In this instance, State resources would be activated to fill the need. During an event responders may become targets, which could hamper their effectiveness.

- **Continuity of Operations:**

The outbreak of widespread rioting or looting could have potential impact on the City of Orlando's ability to deliver services and conduct its normal operations. Protesters could occupy government buildings and interrupt the normal functions of government, or targeted attacks on government facilities could interrupt operations entirely.

- **Private Property:**

Private property often serves as a target in instances of civil disturbance. Businesses can be targeted for looting or vandalism. If an event is particularly large, damage could reach millions of dollars and recovery could take years.

- **Government Facilities:**

Frequently, in acts of civil disturbance, government facilities become the focal point of protests or targets for vandalism. Damage suffered during an event or the inability of a worker to enter a facility may greatly reduce a facility's effective capacity or close it completely.

- **Infrastructure:**

Similar to government facilities, public and private infrastructure can become targets of civil disturbance. Damage to transportation, communications, or utilities infrastructure could further exacerbate the situation.

- **Environment:**

Normally, instances of civil disturbance will have a minimal impact on the environment. However, if petroleum or other chemical facilities were a target for vandalism or large-scale fires occurred, the impact on the environment could be significant.

- **Economic Conditions:**

Civil disturbance could prove economically crippling to the City of Orlando. Large-scale events are usually accompanied by wide-spread absenteeism and damage to private property.

- **Public Confidence in City Governance:**

If an event becomes prolonged or is perceived to be mismanaged, it could greatly decrease public confidence in the governance of the City of Orlando. If the response is seen to be inadequate, individuals may attempt to protect their property by their own means and further degrade the situation.

The City of Orlando bears the first and primary responsibility to control any disturbance that occurs within its jurisdiction. Civil disturbance that remains uncontrolled may warrant aid from Orange County resources. If the civil disturbance remains beyond the capabilities of local law enforcement agencies alone, limited State assistance may be requested. If the restoration of law and order is beyond local, county and state abilities, the Governor may declare a State of Emergency calling on the Florida National Guard to restore order.

The magnitude or severity of a civil disturbance situation coincides with the level of public outrage. They can take the form of small gatherings or large groups blocking access to buildings, or disrupting normal activities. Civil disturbance situations can also be peaceful sit-ins or a full scale riot.

The City of Orlando does not have a history of large-scale civil riots occurring, at least during the last ten years. The City of Orlando does have a history of non-violent demonstrations. Peaceful rallies/protests have taken place primarily in downtown Orlando.

Civil disturbance could have a localized or countywide impact. If an incident occurred, it could cause severe disruption to businesses throughout the City of Orlando and

neighboring jurisdictions. It could also impact vulnerable populations such as the homeless who may be living in the area or workers who are employed in the area.

The City of Orlando is vulnerable to this hazard, but it only has the potential to affect a small portion of the City of Orlando without affecting the entire jurisdiction. Since this hazard can only affect small segments of the City of Orlando at a time, the vulnerability is considered low. This is based on the probability of the occurrence and potential economic losses.

Mass Migration

Due to its geographic location, the State of Florida has a history of mass migration from the Caribbean basin, particularly Cuba and Haiti, as well as the U.S. territory of Puerto Rico. The control of immigration into the United States is the responsibility of the U.S. Department of Homeland Security (DHS) due to aspects of national security and border protection. DHS has prepared for the possible impact of a political instability in any Caribbean country through an operational plan titled 'Vigilant Sentry'. To deal with mass migration influxes at the local level, Orange County has developed the County Migration Plan. While the federal government has the primary responsibility for assuming control of mass migration emergencies, the City of Orlando may be asked to support Orange County in the coordination of humanitarian efforts including the provision of shelter, food, water, medical, and other social services.

A massive, uncontrolled influx of migrants has the potential to significantly disrupt social and economic stability in the City of Orlando by overwhelming the delivery of essential services such as medical response and public safety. Among other consequences that the City of Orlando may face include, but are not limited to, possible civil disturbances, overcrowding of detention facilities, economic stresses on local communities, the need for delivering mass care (sheltering and feeding), and impacts on social services, healthcare, education, children and family services.

On September 20, 2017, Hurricane Maria made landfall in Puerto Rico, devastating the island's infrastructure, causing millions of dollars in damage, and plunging all of its 3.4 million residents into a desperate humanitarian crisis. Millions of U.S. citizens living in Puerto Rico were left without power or running water because of this Category 4 hurricane. Even before Hurricane Maria, Florida had been a primary destination for migrants from Puerto Rico for many years. Puerto Ricans have a long history in the region. By the late 1800s, they were settling in the Tampa Bay area and later in South Florida. It was not until the 1980s that Puerto Ricans started moving in significant numbers to Orlando and other parts of Central Florida. These included islanders as well as Puerto Ricans from New York and Chicago. But it was Puerto Rico's economic

crisis, which began in 2006, that spurred a massive wave. The Puerto Rican population in Florida has risen up to well over 1 million. According to the Puerto Rico Federal Affairs Administration regional office in Orlando, there were already about 1,000 families relocating to Florida each month because of Puerto Rico's severe financial crisis. Many were already thinking of leaving, but after Hurricane Maria left damages of over \$94 billion, the pace of Puerto Rican arrivals increased dramatically. In the aftermath of this extremely destructive hurricane in 2017, many Puerto Ricans were forced to seek jobs and housing on the U.S. mainland.

Early estimates, based on welcome-center visits, school enrollments, FEMA applications, and mobile phone data had put the number of Puerto Rican migrants to Florida at above 50,000 people. However, a study released in October 2018 by the University of Florida's Bureau of Economic and Business Research, which compared passenger flight data between Puerto Rico and Florida with migration data from the U.S. Census, suggested that between 30,000 and 50,000 Puerto Ricans had settled in Florida in the year after the hurricane. According to this study, there appeared to be large flows of Puerto Ricans to Florida in the immediate months after Hurricane Maria in September 2017, but flight data also suggested that there was a strong return flow in January 2018 that was followed by smaller flows back to Puerto Rico in subsequent months.

The State of Florida established a Disaster Relief Center at Orlando International Airport (MCO) to assist hurricane victims in need arriving in Orlando. The City of Orlando Office of Emergency Management provided coordination support efforts. Non-profit organizations, including the American Red Cross, worked alongside FEMA to provide people with food resources, counseling, medical attention, and employment information, among other services. In preparation for an influx of students, the Florida Department of Education temporarily waived regulations to allow Puerto Rican students without access to their education records to enroll in public schools. Additionally, several colleges and universities across Florida, including the University of Central Florida (UCF) in Orlando, waived out-of-state tuition and fees for students displaced by Hurricane Maria. Ultimately, approximately 35,000 people are understood to have permanently relocated from Puerto Rico to the City of Orlando, which is home to a third of Florida's Puerto Rican population and where many people were able to connect with family or friends for help.

The impacts and costs associated with mass migration are difficult to estimate due to the fact that migrant groups generally blend into the wider population within a year or so of setting foot in the City of Orlando.

Critical Infrastructure Disruptions

Critical infrastructure refers to those assets, systems, and functions so vital to the City of Orlando that their disruption or destruction would have a debilitating effect on the economy, governance, public health and safety, and morale. Critical infrastructure refers to transportation, energy systems, banking, and financial assets, water supplies, chemical plants, food and agricultural resources, police and fire departments, hospitals and public health systems, information systems, and government offices.

These disruptions can be caused by several events including, but not limited to, the following:

- Natural or Technological Disasters
- Sabotage
- Equipment Failures

The City of Orlando has a medium vulnerability in experiencing a critical infrastructure disruption to some degree each year, usually with the loss of power to part of the grid due to a thunderstorm; however, these incidents are usually rectified quickly. The probability of encountering this hazard is low.

It is crucial to determine the vulnerability of critical facilities and infrastructure for emergency response efforts and long-term redevelopment strategies. Critical infrastructure disruption could arise in conjunction with another hazard, such as a terrorist event, hurricane, tornado, ice storm, drought, or other hazards.

Disruption in any particular one for a short period does not necessarily indicate a disaster. However, it will likely warrant a swift response by the owner, agency or a combination of entities. Through contingency planning and prompt response at each critical facility, the disruption can be minimized.

Based on the vulnerability assessment of disruption or destruction of critical infrastructure having a debilitating effect on the economy, the estimated and anticipated losses could be \$10,000 to over \$100,000 or more.

Special Events

As a major tourist destination, the City of Orlando is a hub for special events. Throughout the year, the City of Orlando is host to a myriad of venues including festivals, holiday parades, concerts, conventions or conferences, sports events, political events, cultural events, and many other large and small events that gather or have the potential to gather large crowds of people. Such gatherings are supported by

the presence of local emergency services, such as fire, emergency medical services, and law enforcement. While these events are usually cause for celebration, the presence of a large number of people may create an increased vulnerability potential for casualties or losses if an accidental or intentional incident were to occur at an event.

Under normal conditions, such special events take place with few or no major problems. However, when there is an incident, either as a result of a natural or a man-made hazard, then local emergency management and response agencies may become involved. These mass gatherings are also potential targets for terrorist attacks. Typically, the vulnerable populations are the event participants, support staff, and attendees. However, emergency responders cannot discount security risks to related gatherings such as increased populations in downtown areas, theme parks, resorts, etc.

Whether a special event is a one time or infrequent event or an event that takes place on a regular basis, extensive interagency planning is generally required to implement the appropriate safety and security measures. The amount of advance planning and resource mobilization during the event will vary greatly on the size of the expected event and factors such as the prominence of the event (i.e., local, national, or international), media interest, event profiles which may be a draw for possible terrorism or civil disturbance, and pre-event intelligence. Security and command and control operations may be limited to an on-scene incident command for smaller or more routine events, to a partial or full scale City of Orlando EOC activation for larger or more significant events.

Costs resulting from incidents taking place at special events vary greatly depending on the scope of the event. Sponsoring agencies such as corporations and/or nonprofit organizations may defray some these costs. Nevertheless, the financial impacts of such a scenario could be serious for the City of Orlando as it could lose over \$100,000 or more in tax revenue if an incident happened at a special event with the potential for loss of life.

Major Transportation Incidents

A major transportation incident is a distinct possibility in the City of Orlando and could cause significant problems, especially if combined with a terrorist act or HazMat incident. Major transportation incidents can happen at any time and can involve a plane, rail, automobile, bus, or tractor trailer. The City of Orlando has an increased vulnerability for major transportation incidents based on its population density, traffic patterns, weather conditions, and other unknown hazards.

The Florida Turnpike, Interstate 4, and toll roads 528, 429, 417, 414, 408 run through the City of Orlando. Interstate 4 and the Florida Toll Roads are all major thoroughfares for businesses, corporations, and citizens. Tourists also use these highways to visit the major tourist attractions in the jurisdiction. According to the Florida Department of Transportation (FDOT), the City of Orlando has 1,005 miles of paved roads.

Railroads running through the City of Orlando carry freight, hazardous materials as well as passengers on its main rail line, along with several spurs, historically owned and operated by CSX Transportation. These rail lines are also shared by the SunRail commuter trains, which started operating in 2014 and serve to connect Osceola, Orange, Seminole and Volusia counties. There is also one main Amtrak station located within the City of Orlando.

The City of Orlando has one major international airport, Orlando International Airport and one intermediate sized airport, Orlando Executive Airport.

- **Orlando International Airport (MCO)**

MCO has four parallel runways, two which are 12,000 feet long, one that is 10,000 feet and the other is 9,000 feet, allowing simultaneous operation. In 2016, Orlando International Airport handled 41,923,399 passengers, making it the 2nd busiest airport in Florida, and the 13th busiest in the US. On average, 361 flights depart daily from MCO to destinations in the United States, Canada, Mexico, and Europe.

- **Orlando Executive Airport (ORL)**

ORL is situated on 1,056 acres owned by the City of Orlando. The airport has two parallel runways, one is 6,004 feet long, and the other is 4,625 feet long. In 2016 Orlando Executive Airport's aircraft operations totaled more than 109,866.

The probability of a major transportation incident is medium to high based on the factors listed above. The bulk of these incidents involve motor vehicles and tractor trailers. Periodically, a train derailment, toll road closure, or an interstate closure occurs within the jurisdiction. The City of Orlando is also vulnerable to plane crashes; however, most of these have been isolated incidents, where the plane was privately owned and was not a commercial aircraft. Nevertheless, the possibility exists for the crash of a large commercial aircraft resulting in mass casualties.

A major air crash that occurs in a densely populated commercial or residential area can result in considerable loss of life and property. The impact of a disabled aircraft as it

strikes the ground creates the likely potential for multiple explosions, resulting in intense fires. Regardless of where the crash occurs, the resulting explosions and fires have the potential to cause injuries, fatalities and the destruction of property at and adjacent to the impact point. The time of day when the crash occurs may have a profound effect on the number of dead and injured. Damage assessment and disaster relief efforts associated with an air crash incident will require support from other local governments, private organizations, and in certain instances from the state and federal governments. It can be expected that few, if any, airline passengers will survive a major air crash. The intense fires, until controlled, will limit search and rescue operations. Police barricades will be needed to block off the affected area. Crowds of onlookers and media personnel will have to be controlled. Emergency medical care, food, and temporary shelter will be required by injured or displaced persons. The clean-up operation may consist of the removal of large debris, clearing of roadways, demolishing unsafe structures and towing of demolished vehicles. It is impossible to totally prepare, either physically or psychologically, for the aftermath of a major air crash. However, since air crash incidents are no longer a probability but a reality, air crash incidents must be included among other potential disasters.

Radiological/Nuclear Accidents

The State of Florida currently has three nuclear power plants. These include:

- Crystal River Nuclear Power Plant
- St. Lucie Nuclear Power Plant
- Turkey Point Nuclear Power Plant

According to the Federal Emergency Management Agency (FEMA), a plume emergency planning zone (EPZ) is for those communities within a 10-mile radius of the plume exposure of a nuclear plant.

The ingestion exposure pathway is where the population may be vulnerable to the health effects associated with the ingestion of contaminated food and water. An ingestion-planning zone exists for communities within a radius of 50 miles from a nuclear plant. There is a low probability of a radiological accident of this type affecting the City of Orlando or Orange County directly. The City of Orlando and Orange County are not located within the immediately vulnerable zone of the closest fixed nuclear facility. The St. Lucie Nuclear Power Plant, which is over 100 miles away, is the closest facility. However, the impact is indirect, as Orange County would serve as a host county for persons evacuating from St. Lucie.

At the Kennedy Space Center located in Brevard County, spacecraft that are launched while hauling Radioisotope Thermoelectric Generators create a low risk for long term

exposure here in Orange County. However, during these launches, Orange County has been designated as an ingestion county, which means that in the event of a launch emergency, Orange County would be at risk for long-term exposure from the radioisotope. The probability of this occurring is low due to the Kennedy Space Center's exceptional record of successful launches as well as budget cuts to NASA missions that have limited launches in recent years.

The Nuclear Regulatory Commission has estimated that 3 million packages of radioactive materials are shipped each year in the United States, either by highway, rail, air, or boat. There are several facilities within the City of Orlando (hospitals, universities) that use small amounts of radioactive substances for medical and research purposes making the vulnerability low to medium. However, in the past 10 years, there have been no significant incidents within our jurisdiction.

A radiological/nuclear-related incident could have profound effects on the county based on its proximity, size, and intensity. In a worst-case scenario, it could contaminate portions of the City of Orlando and injure or kill residents. This hazard would also have a profound impact on local and state economies.

Concept of Operations

Florida Statute 252.38 authorizes and encourages the government of the City of Orlando to organize and plan for the protection of life and property from the effects of an emergency or disaster. The organization and operations required by this plan follow the tenets of the National Incident Management System (NIMS) and uses the Incident Command System for operational, resource and support management in the various phases of emergency management.

The City of Orlando provides many emergency services to citizens on a daily basis. Some of these services overlap into surrounding jurisdictions. While the City of Orlando delivers many services to its citizens, it also is dependent on Orange County for social services, health, sheltering of evacuees, and other services. The Office of Emergency Management provides normal day-to-day coordination, direction, and control of all phases of emergency management.

The City of Orlando functions under a strong Mayor form of government. The Mayor is the ultimate authority in the City with regard to emergency or disaster operations. Weather events that can be forecasted and become a potential threat to the City of Orlando include tropical storms, hurricanes, and flooding events. Based upon the potential threat to the City, these events also may trigger an emergency declaration, implementation of the CEMP, and activation of the EOC in accordance with the following procedure:

City Administration Organization

1. The City of Orlando's normal day-to-day operations, absent of a declared State of Local Emergency, are under the authority of the Mayor and six elected commissioners.
2. The Mayor, as the top elected official of the City of Orlando, a political subdivision of the State of Florida, is vested with certain authority with regard to emergency management pursuant to Chapter 252, Florida Statutes. The Mayor has the following authorities, pursuant to Florida Statute, Chapter 252 and further expanded in City Ordinances Chapter 43 to the following:
 - Declare a Local State of Emergency
 - Ordering mandatory and voluntary evacuations
 - Ordering the establishment of curfews
 - Entering into contracts and incurring obligations
 - Employment of permanent and temporary workers

- Overseeing the utilization of volunteer workers
 - Authorizing the renting of equipment
 - Acquisition and distribution of resources, with or without compensation of supplies, materials, and facilities.
3. The Chief Administration Officer administers the daily routine operational business of City government in a manner consistent with policy established by the City Council. The City government is organized into functional departments and divisions created by the City Council for the delivery of essential government services. Each department is assigned for direct supervision to one of two Deputy Chief Administration Officer.
 4. Direction and control of all government-related activities during the response, recovery, and mitigation stages of an emergency event is the responsibility of the Mayor.
 5. Line of Succession is The Mayor or Mayor Pro Tem in the absence of the Mayor will declare a Local State of Emergency and activate the CEMP. In the event the Mayor is not available to provide continuous leadership authority and responsibility, the following line of succession has been established: the first Mayor Pro Tem and then the Second Mayor Pro Tem.

Emergency Management Organization

1. Response

When a disaster occurs, the City of Orlando responds with direct assistance to the disaster area. Any external support agencies to on-scene responders will be integrated into our operations. The response agencies act within their scope of training and call upon outside resources as needed to mitigate further impact and damages. The City of Orlando Emergency Operations Center coordinates additional resources when called upon to do so.

2. Recovery

After the immediate short-term emergency needs of an area are controlled, the community partners begin a recovery process that may take several days to many months or years. Emergency Management and response agencies determine the community impacts as well as the needs to return the community to pre-disaster conditions. Many times this effort overwhelms the jurisdiction and assistance is required from state and federal government.

3. Mitigation

Through planning, floodplain management, and building inspection programs, the City of Orlando uses codes, ordinances, and standards to minimize the impact on residential and commercial areas. This effort helps prevent sub-standard building construction, which can exacerbate disaster impact. Public education about potential disaster effects also prevents injury and death from disasters. Public participation in preparedness exercises also prevents injury and death from disasters. The City of Orlando is an active participant of the Orange County Local Mitigation Strategy Plan.

4. Local State of Emergency Declaration Process

A State of Local Emergency will be requested by the Emergency Management Director when an event has occurred; is anticipated to generate major damage in the City of Orlando; threatens the health and safety of City residents; or is anticipated to be beyond normal response capabilities.

- a. The following sequence of events will occur when a declaration is deemed necessary by the Emergency Manager:
 - The Emergency Manager will notify the Fire Chief and advise of the nature of the event and potential need to declare a State of Emergency and activate the EOC.
 - The Fire Chief will advise the Deputy Chief Administration Officer of these recommendations and forward them to the Chief Administration Officer.
 - The Chief Administration Officer or his designee will advise the Mayor and request signature of a prepared State of Local Emergency Declaration. In the absence of the Mayor, the Mayor Pro Tem is the designee.
 - Upon execution of the State of Local Emergency Declaration, all departments and agencies will be notified.
 - Conference calls will be scheduled with disaster response partners.
 - The Public Information Officer will prepare and release appropriate announcements advising the public of the nature of the emergency.
 - The State of Local Emergency declaration will remain in effect for seven days until it expires or a subsequent declaration of the Mayor rescinds it.
 - Upon the recommendation of the Executive Policy Group or the Emergency Manager, a continuation of the State of Local Emergency may be requested.
- b. Executive Policy Group (EPG). The EPG maintains executive decision-making authority throughout all stages of a disaster event on behalf of the City of

Orlando. The EPG manages the Emergency Operations Group to ensure efficient disaster operations. The ongoing administrative and logistical implementation of the CEMP is administered through this executive body. This group is composed of the following individuals:

- Mayor,
- Chief Administrative Officer,
- Chief of Staff
- Deputy Chief of Staff
- Fire Chief,
- Police Chief,
- Public Works Director,
- City Attorney,
- Chief Financial Officer,
- Chief of Staff,
- and the Emergency Manager

The Chief Administrative Officer will contact and coordinate with key governmental agencies in the surrounding area and brief City Council members on the type of disaster, its anticipated severity, and expected impact on the community

- c. The Office of Emergency Management (OEM). Emergency Management is the managerial function charged with creating the framework within which communities reduce vulnerability to hazards and cope with disasters. OEM also manages the day to day operations of the emergency operations center. During day-to-day operations, the Office of Emergency reports to the Fire Chief. During an emergency or a Level I activation, the Office of Emergency Management reports to Mayor. The Emergency Manager is designated as the single point of contact to serve as the coordinator and direct support to the incident command system in the field operations.
- d. The City of Orlando Emergency Operations Center. The Emergency Manager recommends the activation of the Emergency Operations Center to the Fire Chief, Chief Administration Officer, and approved by the Mayor. Upon notification and activation of the EOC, the Finance Department will direct all of the department fiscal managers to monitor and track expenditures associated with the activation or incident.

The City of Orlando Emergency Operations Center EOC is located in the Orlando Operations Center. The City of Orlando Emergency Operations Center (EOC) serves as the central command and control point for emergency-related operations and activities, and requests for deployment of resources. The Emergency Operations Center will be activated for all incidents requiring a significant dedication of resources and/or extraordinary inter-agency coordination outside the realm of normal, day to day emergency situations responded to by law enforcement, fire and EMS agencies.

The City of Orlando Emergency Operations Center (EOC) provides for the Continuity of Government and Continuity of Operations in the event of a major disaster. The basic concept for emergency operations in the City of Orlando calls for a coordinated effort and gradual response by personnel and equipment from the City, Orange County, and other disaster support agencies in preparation for, and in response to, local disasters. The local governments will bear the initial responsibility for disaster response and recovery operations within their jurisdiction.

If the City of Orlando's resources are overwhelmed, assistance will be requested from the County. If the requested assistance is beyond Orange County's capability, the County will request State and Federal assistance from the State Emergency Operations Center (SEOC). In order to ensure an adequate and timely response by emergency personnel and the maximum protection and relief to citizens of the City of Orlando before, during, and after a disaster, the concept also provides for:

- Preparation for, and mitigation of, natural and human-made disasters
- Coordination of early warning and alert of citizens and officials.
- Reporting of all natural disasters between levels of government.
- Establishment of the Emergency Operations Center (EOC) and the organization for command and control of emergency response forces.
- Use of increased readiness conditions and response checklists for all hazards or any other disaster events.
- Coordination of shelter and care of evacuees.
- Damage assessment reports and procedures.
- Return of evacuees when authorized by the appropriate authorities after the disaster danger has passed.
- Recovery operations.
- Mitigation operations.

5. Notification

The Office of Emergency Management is responsible for making the initial notification to the City of Orlando Emergency Management Team prior to or following an emergency and/or disaster.

6. Activation

Once notified, the City of Orlando Emergency Management Team should begin making efforts to activate their personnel and/or equipment to respond to and recover from an emergency and/or disaster.

7. Deactivation

Following an emergency and/or disaster the Emergency Manager may recommend to the Executive Policy Group to begin demobilizing resources and personnel.

8. EOC Activation Levels

- Level 3 - Monitoring

This involves OEM monitoring daily events and notifying members of the City of Orlando Emergency Management Team if an emergency and/or disaster require their support or resources.

- Level 2 - Partial Activation

This is a partial activation where only the incident-specific members of the City of Orlando Emergency Management Team will staff the EOC. The Emergency Manager can activate the EOC to Level 2 in consultation with the Executive Policy Group.

- Level 1 - Full Activation

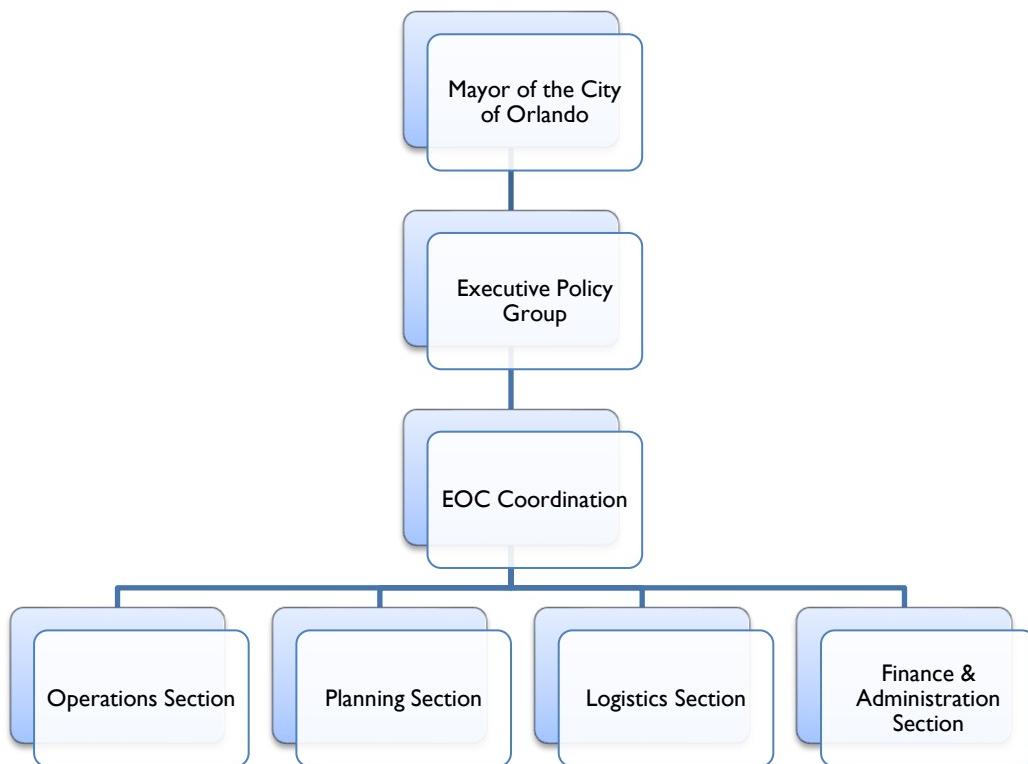
This is a full-scale activation. The EOC is fully staffed by the City of Orlando Emergency Management Team. The Mayor or the Chief Administrative Officer is responsible for activating the EOC to Level 1.

9. City of Orlando Emergency Management Team

This team is composed of City departments, divisions, private sector, and non-profit organizations. Their mission is to safeguard the citizens and visitors by ensuring the rapid response and recovery of the City to a variety of hazards. This team is organized according to the National Incident Management System and serves as the Preparedness Organization for the City of Orlando.

OEM is responsible for coordinating the activities of the City of Orlando Emergency Management Team prior to and following an emergency and/or disaster. City of Orlando Emergency Management Team is composed of the following groups shown in Figure S.

Figure S: City of Orlando Emergency Management Structure



These groups also include the following sections.

- **Operations Section:**

This section is responsible for performing emergency response, law enforcement, and public works operations during an emergency and /or disaster.

- **Planning Section:**

This section is responsible for gathering, processing, and publishing of information that flows into and outside of the EOC.

- **Logistics Section:**

This section is responsible for the logistical resources needed to support the management of an emergency and/or disaster.

- **Finance and Administration Section:**

This section is responsible for the financial record keeping that is essential prior to and following an emergency and/or disaster.

- **EOC Coordination:**

This element is responsible for coordinating the actions of the EOC Sections as directed by the Emergency Manager. The element is an augmentation by the Orlando Fire Department to OEM and composed of:

1. EOC Supervisor

Under the direction of the Emergency Manager, this individual is the designated coordinator of the EOC.

2. EOC Operations Desk

The EOC Operations Desk serves as OEMs representative in the EOC. Its primary responsibility is to oversee EOC operations and acts as a liaison with the County EOC and State and Federal Officials.

3. Emergency Information Center (EIC)

The City of Orlando operates one call center prior to and immediately following an emergency and/or disaster. The EIC is activated when the EOC is at a Level 2. Their responsibility is to receive, route, and if possible resolve non-emergency calls from citizens and visitors.

4. ESF 5 Message Desk

During EOC activations the mission of this Message Center is to operate as the EOCs 24-Hour Answering Point. Their responsibilities include processing calls and forwarding them to the appropriate members of the City of Orlando Emergency Management Team.

5. OEM Support Team

This team is responsible for the technical needs and maintenance of the EOC. This group operates under the direction of the Emergency Manager/EOC Supervisor and consists of the following agencies and vendors:

- o Crisis Management Software Vendors
- o Audio-Visual Vendors
- o Telephone Service Companies
- o Satellite Phone Providers
- o City of Orlando Information Technology/GIS
- o ESF#14-Public Information (Social Media and Media Coordination)

6. Emergency Support Functions (ESFs)

The City of Orlando has 19 Emergency Support Functions (ESFs). An ESF represents specific response activities that are common to all disasters.

Each ESF has a primary agency or agencies and several support agencies, their roles and responsibilities include:

- o The Primary agency or agencies are responsible for coordinating the missions of the ESF and activities of the support agencies through all five phases of emergency management.
- o The Support Agencies are responsible for supporting the activities and missions of the ESF with their own resources and maintaining regular communication with the primary agency.

7. Field Operations Centers (FOCs)

In support of direction, control, and coordination activities, Field Operations Centers (FOC) may be set up to assist in managing the many different activities associated with emergency support function operations. These centers will be established and staffed by personnel from the respective ESF agencies involved in the emergency response process. Field Operations Centers will communicate and provide their respective ESF representative in the EOC with an ongoing status of operations. Those City departments that will typically establish FOCs for field operations coordination are Fire, Police, and Public Works. Many other City departments or associated agencies may find it necessary to set up a FOC whenever the tasks at hand require several staff/personnel to operate out of one location to coordinate all personnel in the field.

8. Emergency Coordinating Officers (ECOs)

Each department designates an Emergency Coordinating Officer (ECO). The ECO is the primary contact for the Emergency Manager for any emergency management coordination efforts. The ECO informs the Department Director, Division Manager, and Emergency Support Function (ESF) personnel of any emergency management related event. The ECO ensures that all designated EOC Operations Group positions are, updated, trained, and staffed.

9. Disaster Response Partners

These are agencies and organizations that are not part of an ESF and that require coordination before, during, and following an emergency and/or disaster.

10. Lead Agencies and Support Functions

Table 37 shows the lead agencies in the Emergency Support Function (ESF) organization structure.

Table 37: Lead Agencies and Support Functions for ESFs

Position	ESF	Function	Primary Agency
Operations			
Transportation	01	Coordination of all transportation services	Transportation Department
Public Works	03	Lifesaving support relief through engineering services, technical evaluation, inspection, infrastructure evaluation, debris clearance, and disposal	Public Works
Fire Service	04	Provide resources needed for the detection and suppression of urban, rural, and wildland fires.	Orlando Fire Department
Mass Care Support	06	Coordinates activities for the emergency provision of temporary shelter, mass feeding and bulk distribution of coordinated relief supplies.	Families, Parks, and Recreation American Red Cross
EMS	08	Provide health, medical and behavioral support services to the community and responder during and after the disaster.	Orlando Fire Department
Search and Rescue	09	Coordinates the responsibilities associated with locating, rescuing, extricating and treating victims.	Orlando Fire Department
HAZMAT	10	Provides an overview of roles associated with hazardous materials events to include chemical, biological and radiological.	Orlando Fire Department
Utilities	12	Outlines the policies for water and electrical power outages	Orlando Utilities Commission
Military Support	13	Coordinates Military Support	Department of Defense
Law Enforcement	16	Outlines the policies for the protection of life and property and maintenance of law and order.	Orlando Police Department

Position	ESF	Function	Primary Agency
Business and Industry	18	Develops operational concepts to maximize the utilization of locally owned and operating businesses.	Economic Development Department
Damage Assessment	19	Responsible for the collection, analysis, and distribution of damage assessment information for public and private building, business, and homes.	Economic Development Department
Planning			
Emergency Management	05	Coordinates the collection, processing, display and dissemination of info.	Office of Emergency Management
Public Information	14	Coordinates the collection, processing, display, and dissemination of public information.	Office of Communications & Neighborhood Relations
Information Technology	02	Coordinates the provision of Information Technology support.	Technology
Volunteer & Donations	15	Manages unsolicited, donated goods and recruits, train and manage unaffiliated volunteers.	Office of Community Affairs
Logistics			
Procurement	07	Provides guidance for logistical support of all response and recovery operations	Office of Business and Financial Services- Procurement
Food & Water	11	Identifies food, water, and ice needs in the aftermath of a disaster	Office of Business and Financial Services - Procurement
Facilities	20	Coordinates the provision of all public facilities resources	Office of Business and Financial Services - Facilities

Position	ESF	Function	Primary Agency
Finance & Administration			
Accounting Operations		Track finances	Office of Business and Financial Services- Accounting Operations

Preparedness Activities

In accordance with the National Incident Management System (NIMS), the City of Orlando Office of Emergency Management provides various preparedness activities for personnel expected to operate during a disaster or emergency.

1. General Issues

The Office of Emergency Management is responsible for the plan development and maintenance of the City of Orlando Comprehensive Emergency Management Plan (CEMP). These responsibilities include preparation, coordination, publication, and distribution.

The CEMP will be updated and revised in cooperation with all city departments, organizations, and disaster response partners. The CEMP is a living document and is reviewed, updated and then recorded in the Record of Changes to reflect the changing situation and hazards that exist within the City of Orlando. The CEMP is reviewed, updated and revised in accordance with the City of Orlando Office of Emergency Management Plan Maintenance Standard Operations Procedure.

2. Persons with Special Needs Program

The Persons with Special Needs Program (PSN) is a county-level program. Many residents of the City of Orlando are registered with this program. The Persons with Special Needs Program (PSN) is coordinated by the Orange County Health Services Department and supported by the Family Services Department and through partnerships with the Orange County Health Department (Florida Department of Health) and other community partners. The PSN program is a multi-faceted system that includes a registration process, a public education program, transportation

coordination, and temporary sheltering services. Clients are notified in the following manner:

- Advertisement through local media.
- Information distributed through Home Health Care agencies and the Department of Health.
- Orange County Council on Aging client contact lists.
- Directly through Orange County Office of Emergency Management.

Florida Statute requires utility companies to notify customers twice annually on the availability of the Special Needs registration program. Notification is to occur in January and again in May. New customers shall receive notification upon instituting a new account.

3. PSN Registration

Orange County actively manages the PSN Registry with information provided from home health agencies, visiting nurses agencies, and durable medical equipment companies. Registry information is provided through public events. Client information is accumulated year round and stored in a database. The registry data is provided to emergency response agencies for awareness and for follow up after a disaster.

4. Public Awareness and Education

The City of Orlando Office of Emergency Management releases Public Service Announcements throughout the year. These announcements contain information about coming preparedness events as well as specific safety topics such as hazardous weather, wildfire conditions, hurricane preparedness topics, and mitigation issues. Shelter information is released with specific language directing the public to confirm openings before an event. The Office of Emergency Management also conducts disaster preparedness presentations and workshops by request throughout the year. Groups and organizations that can request a presentation include, but are not limited to, homeowner associations, community groups, faith-based organizations, and assisted living and nursing facilities.

Media Relations and Public Information

ESF-14 – Office of Communications and Neighborhood Relations is the lead agency for communicating with Media and distributing emergency information to the general public. Many methods are employed to disseminate emergency information and instructions to the public:

- Media Coordination

- City of Orlando Government Website
 - Social Media

Public Warning and Notification

1. Public Warning Systems

To alert citizens and visitors to severe weather and other hazards the City of Orlando Office of Emergency Management coordinates with Orange County and utilizes a multi-layered system that includes:

- NOAA Weather Radio
- Code Red (Reverse Dialing)
- Emergency Alert System
- Media Coordination
- City of Orlando Government Website
- City of Orlando Facebook page
- City of Orlando Twitter page
- Partners such as 211 / 311
- Door-to-door Notification by First Responders

Citizens of the City of Orlando are encouraged to register or utilize the following:

- OCAlert.Net
- OCFL Alert Smartphone Apps
- Orange County 3-1-1

Emergency Actions to be taken, shelter locations and status, as well as evacuation zones and routes are some of the items included in Public Information messaging.

2. Responsible Agencies

The City of Orlando Office of Emergency Management has the overall responsibility of coordinating with Orange County Office of Emergency Management for additional support with the County's warning and notification systems. There are two designated communication hubs where warning and notifications are executed on behalf of Orange County:

- a. The Orange County Fire Rescue Communications Center serves as the primary county's 24-hour County Warning Point (CWP). The City of Orlando Fire

Department Communications Center serves as the City of Orlando's 24-hour warning point.

- b. The City of Orlando EOC, during activation, is responsible for coordinating warning messages citywide. The City of Orlando will coordinate any specific message to the Orlando residents.
3. Joint Information Center

A Joint Information Center (JIC) is a physical location where public affairs professionals from organizations involved in incident management activities can collocate to perform critical emergency information, crisis communications, and public affairs functions collectively. ESF #14 should activate a JIC if multiple disciplines and/or jurisdictions are involved.

Exercise Program

The Office of Emergency Management maintains a comprehensive exercise program designed to discuss, practice, evaluate, and improve emergency plans and procedures for all-hazards. OEM participates in exercises with various agencies, such as the City of Orlando Emergency Management Team, the State of Florida, Orange County Public Schools, Universities, Theme Parks, Hospitals, Community Emergency Response Teams, and volunteers.

1. Program Coordination

The OEM Exercise Coordinator will manage this exercise program in accordance with Homeland Security Exercise and Evaluation Program (HSEEP) guidelines. HSEEP is a capabilities and performance-based exercise program that provides a standardized methodology and terminology for exercise design, development, conduct, evaluation, and improvement planning for all exercises. HSEEP was designed to meet all Federal standards established in Homeland Security Presidential Decision Directive 8. This program is coordinated by two entities:

- Exercise Coordinator – is responsible for the City of Orlando's emergency management preparedness plans and operational procedures as well as for ensuring exercises are regularly planned, scheduled, conducted, and evaluated, and that corrective actions are implemented in accordance with HSEEP.
- Exercise Design Team - is composed of selected City of Orlando Emergency Management Team formed to facilitate communications and cooperation in the development and execution of the exercise program. Exercises require careful

planning around clearly identified goals; then designing, developing, conducting, and analyzing the results.

2. Exercise Schedule

OEM selects various areas of preparedness to be exercised each year. This schedule includes exercising the functions and procedures to be used during EOC activations as well as participating in other local, state, and federal exercise scenarios. OEM will ensure that each ESF participates in at least one exercise annually.

The City of Orlando Emergency Management Team also participates in other scheduled exercises within our jurisdiction/region which include: Federal, State, Municipal, Local Emergency Planning Committee (LEPC), Regional Domestic Security Tasks Force (RDSTF), Urban Area Security Initiative (UASI), and various scenarios exercises, such as with hospitals and airports.

3. Exercise Format

The exercise program must meet all standards that address an “All-Hazards” approach which utilizes both the NIMS and HSEEP guidance. Exercises typically focus on the operating procedures of each Emergency Support Function and component, and include hands-on operational use of the EOC’s crisis information management system - WebEOC. The exercise program will utilize the following types of exercises to maintain a certain level of proficiency in emergency response:

- Tabletop Exercise
- Drill
- Functional Exercise
- Full-Scale Exercise

The agencies and/or organizations conducting these exercises must abide by the HSEEP in setting up, executing, and conducting the exercises. Exercise Design Team members may be used as the controllers and evaluators during the exercise.

4. Corrective Action Process

a. Purpose:

Before an actual event or disaster, agencies should review their lessons learned and implement recommended corrective actions as indicated in the previous improvement plan (IP). The overall process of identifying, implementing, and tracking corrective actions is crucial to the improvement of the emergency preparedness program’s readiness.

b. Documentation Process and Methods:

During the exercise evaluation and improvement process, Exercise Staff, Controllers, and Evaluators will coordinate the collection and consolidation of information from various activity reports and compile After Action Reports and Improvement Plan recommendations for each exercise. The Exercise Design Team should follow the HSEEP published guidance to develop the final improvement plan. Before an exercise, each participant should review their Emergency Operations Procedures, including the use of all documentation processes, such as:

- Incident Action Plans
- Messages
- Situation Reports
- Job Aids
- WebEOC Procedures
- Media Reports
- Exit interviews or critique forms
- Hot-washes

Training

This section provides guidance and information for all personnel preparing for major disaster emergency management (EM) operations. The EM training program is administered and coordinated through OEM. OEM works closely with the Emergency Coordination Officers who assist with specific instructional training and maintains personnel training credentials. The City of Orlando Office of Emergency Management publishes a yearly training calendar for city employees. The list includes all emergency management responder training that provides basic course information, dates, times, and locations for employees. For other non-City employees, OEM utilizes the State Emergency Response Team Training Resources and Activity Center (SERT TRAC) to distribute training course information.

The City of Orlando Government requires all employees assisting in emergency response to complete prerequisite courses identified by emergency management procedures and other specified training required for position based assignments within the City of Orlando Emergency Management Team organizational structure. In addition to meeting the National Incident Management System (NIMS) and Incident Command Systems (ICS) compliance, OEM continues to update EM courses identified by Federal, State and local requirements or issues identified in After Action Reports and Improvement Plans.

OEM is responsible for identifying personnel training requirements as part of the emergency phases – preparedness, response, recovery, and mitigation. OEM provides additional guidance in the disaster preparedness emergency drills and exercises to test plans, procedures, and efficiency. OEM conducts an annual local training needs assessment and consolidates the data to provide input for regional training and exercise planning considerations.

The City of Orlando participates in the State of Florida and Federal EM training programs. Florida Division of Emergency Management (FDEM) maintains a Multi-Year Training and Exercise Plan (MYTEP) for all-hazards training needs in which the county provides annual training input.

1. Emergency Management Team Training

This program provides position-specific training to employees working in the emergency response role and is geared towards preparing personnel to serve in the following positions:

- ESF/ECO Staff
- Points of Distribution Staff
- Shelter Managers
- Emergency Information Center Operators

2. EOC/FOC Training Program

This program is geared towards training the EOC staff on procedures and policies that are used during activations.

- Emergency Operation Center and Field Operation Center staff
- WebEOC Incident Management System

3. Emergency Management Team Training Courses

Emergency management training courses were identified from the list of courses made available by FEMA, the FDEM and local courses created for this program. These courses encompass a variety of classes; include mitigation, response, and recovery subjects. The Emergency Training Course Matrix is enclosed in Appendix B.

a. State Training Program:

The State's emergency management training bureau provides both State and Federal designated mobile training throughout the regions, and specific types of training are requested through the State. Courses are offered for regional

emergency responder and the County OEM coordinates with the State to host regional training courses. FDEM maintains an online training calendar called SERT TRAC; this website is the State's EM training database where individuals upload EM education course credentials and register for upcoming courses. The State recommends any counties hosting local training and exercise events can submit their activities to be listed on SERT TRAC.

b. Federal Training Program:

The National Emergency Training Center (NETC) at Emmitsburg, MD serves as the national academy for the development and delivery of emergency management training nationwide. NETC offers a full residential on-campus program and mobile training courses for local delivery training to emergency personnel. NETC is the home to Emergency Management Institute (EMI) which is responsible for the independent study program for individual training for a vast variety of subjects. The main type of training courses offered that's required most through this program includes the following:

- Professional Development Series (PDS)
- Advanced Professional Development Series (APS)
- National Incident Management System/Incident Command System (NIMS/ICS)

Mutual Aid Agreement and Memorandums

The City of Orlando is a signatory of the statewide mutual aid agreement, Emergency Management Assistance Compact as coordinated through the state EOC. Requests and delivery are coordinated through the State Warning Point. During a statewide or regional emergency, all requests are coordinated first in the County EOC and then in the SEOC through mission tasking.

Statewide Mutual Aid Agreement (SMAA)

The SMAA supersedes other inter-local agreements during major or catastrophic disasters. The SMAA may also be applicable between participating parties in the absence of an inter-local agreement during minor disasters. Requests for assistance under the SMAA should be made through the County EOC to the State EOC for a mission assignment. The City of Orlando is a signatory to the Statewide Mutual Aid Agreement.

The EOC serves as the central coordination point for all resource requests in the City when activated. Mutual aid will only be requested if Fire Command and or the Emergency Manager deems that local resources are inadequate to handle a situation.

The authorized representative shall transmit all normal mutual aid requests through Orlando Fire Department Communication Dispatch. If the EOC is activated, the request shall also go through the EOC Operations Desk. The request is then delivered to the responsible agency, which is monitored by the EOC Operations Desk. If for any reason the County cannot fulfill these requests, or services are overwhelmed, the County will coordinate with the state ECO and keep the City EOC informed.

The following steps will be followed in making requests for resources from other government organizations that have entered into the aforementioned agreement:

- a. The Mayor declares a local state of emergency because a disaster has occurred. A copy of the declaration is then sent to the Florida Division of Emergency Management (FDEM) in Tallahassee via the Orange County Office of Emergency Management.

The authorized representative will make direct contact with the State Watch Office and provide the information listed below. The EOC Operations Desk will follow-up with written confirmation to the County EOC Operations Desk and passed along to the State using the Florida Division of Emergency Management (FDEM) WebEOC System:

- A description of the damage sustained or threatened;
- An identification of the specific Emergency Support Function or Functions for which such assistance is needed;
- A description of the specific type of assistance needed within each Emergency Support Function;
- A description of the types of personnel, equipment, services, and supplies needed for each specific type of assistance, with an estimate of the time each will be needed;
- A description of any public infrastructure for which assistance will be needed;
- A description of any sites or structures outside the territorial jurisdiction of the Requesting Party needed as centers to stage incoming personnel, equipment, supplies, services or other resources;
- The place, date, and time for personnel of the Requesting Party to meet and receive the personnel and equipment of the Assisting Party along with a technical description of any communication or telecommunication equipment needed to ensure timely communications between the Requesting Party and any Assisting Parties.

- b. When a request is received from FDEM or a Requesting Party to provide assistance, the Office of Emergency Management Manager or the On-Call will immediately contact the appropriate agency head to determine if resources are available. The following steps will be adhered to in processing the request:
- Convey to the agency head the information received from FDEM or Requesting Party. This information will be provided via voice then entered into the WebEOC system and the State's tracking system;
 - Advise the appropriate agency head that the Statewide Mutual Aid Agreement stipulates that "assisting parties shall render assistance to the extent personnel, equipment and resources are available". Also, advise "participating governments agree to render assistance to the fullest extent possible". The agency head should be informed that the Requesting Party is responsible for costs incurred unless there is an agreement between the parties that all or a portion of the costs will be provided on a gratis basis;
 - Agency head determines if the resources requested can be provided;
 - After the determination has been made, the resource request form will be completed in WebEOC for internal City departments. An external resource request would consist of contacting Orange County Emergency Management via phone or email. Orange County Emergency Management will then submit the request on the City's behalf. Once the request is submitted, City of Orlando OEM will have visibility and will be able to track the status of the resource request at the State level.
 - OEM will provide a copy of the request to the requesting party and FDEM immediately for verification;
 - The Requesting Party/FDEM shall respond by executing and returning a copy to the Assisting Party ASAP. OEM will notify the agency head and provide a copy of the executed documentation;
 - If the request was not routed through FDEM, OEM will contact the State Warning Point and advise them of the request and the response to the request as soon as possible. Subsequently keeping FDEM informed if the Requesting Party made the request directly to the Assisting Party.

Financial Management

General Responsibilities

It is anticipated that response and recovery efforts will generate overtime for City employees. These costs include any emergency personnel deployed out-of-city in

support of operations conducted under the provisions of the Statewide Mutual Aid Agreement.

It is anticipated that response and recovery costs may be recouped at some level, provided sufficient documentation is available.

Therefore, the purpose of the Office of Business and Financial Services (OBFS) Department process in the City of Orlando is to ensure the documentation of all costs associated with the preparedness for, response to, and the recovery from a disaster. This documentation is necessary for the facilitation of reimbursement of the costs associated with a disaster.

Office of Business and Financial Services Department

- Files Requests for Public Assistance on behalf of the City;
- Coordinates the compilation of all City project worksheets by departments;
- Interfaces with state and federal personnel throughout the public assistance grants process, e.g., public assistance, HMGP;
- Is the coordination point for State Public Assistance Coordinator (PAC) and FEMA PAC;
- Coordinate with Facilities Management to identify permanent work project options with departmental, state, and federal representatives;
- Coordinates appropriate financial resources for permanent work project options;
- Coordinates appropriate financial resources for all improved or alternative projects.

City Department and/or Division

- Identifies their recovery projects through damage assessment;
- Prepares a list of damaged sites and emergency work performed;
- Prepares project worksheets to restore each site/facility to pre-disaster conditions;
- Provides needed information to project officials;
- Public Works coordinates the necessary documentation for project worksheets with project officers;
- Public Works coordinates field inspections of recovery work;
- Public Works provides a contact person who accompanies the PAC or Project Offices for site damage surveys;
- Provides cost breakdowns for all completed work;
- Orlando Fire Department coordinates all necessary documentation in mutual aid events;

- Coordinates with the Office of Business and Financial Services (OBFS) Department for any appeal processes.

Office of Emergency Management

- Coordinates technical assistance, notification, and training to city personnel;
- Coordinates the applicant briefing with state and federal personnel;
- Advertises the Applicant Briefing to appropriate agencies;
- Supplies interested parties with technical assistance where necessary;
- Coordinates with the Office of Business and Financial Services (OBFS) Department recovery reimbursement training when appropriate to include:
 - Applicant process
 - Necessary documentation
 - Use of appropriate forms
 - Local declaration emergency/request for state assistance Initial damage assessment
 - State emergency declaration process
 - Preliminary state/federal damage assessment process
 - Request for Presidential Disaster Declaration process
 - Public Law 100-77 (Robert T. Stafford Act)
 - Emergency Assistance Act of 1988, Public Law 93-288, and Disaster Act 1974

Coordination Responsibilities

Financial management immediately prior to and following a disaster declaration and/or local state of emergency is the responsibility of each department and/or organization's fiscal staff. The City of Orlando Office of Business and Financial Services provides overall fiscal coordination for all of the City of Orlando Emergency Management Team during an incident.

Guidance and Training

The City of Orlando Office of Business and Financial Services and the Accounting and Control Division share the role of staffing the Finance/Admin Section (FAS) during Emergency Operations Center activations. The FAS provides guidance and evaluation of all financial management components before, during, and following a disaster. FAS will also ensure complete and accurate records of emergency expenditures and obligations, including personnel and equipment costs, will be kept in anticipation of potential future reimbursement.

The Accounting and Control Division will ensure that periodic training sessions are conducted to include reporting guidelines and processes involving State and Federal disaster assistance. The Accounting and Control Division coordinates with the Office of Emergency Management in the delivery of such courses.

Documentation and Reimbursement Procedures

Copies of all expenditures, including personnel timesheets, must be kept by all departments, agencies, and municipalities to provide clear and reasonable accountability and justification for potential future reimbursement. Reimbursement for disaster-related expenditures are not automatic and require detailed records for authentication by FEMA.

Disaster assistance funding requires specific agreements under CFR 44. These agreements specify performance and reporting responsibilities. The Finance/Admin Section initiates reporting requests to the involved departments and agencies. All involved departments and agencies are expected to cooperate in the timely submission of the necessary reporting information. It is the responsibility of the Emergency Manager is to ensure and facilitate accurate and thorough report concerning any disaster assistance funding requests.

Required reports are submitted to the Florida Division of Emergency Management (FDEM), or the Disaster Field Office (DFO), in accordance with guidance provided by FDEM.

Mutual Aid and Billing

At times, the City of Orlando may provide mutual aid to other counties, municipalities, or agencies as an assisting party. In most cases, automatic or established mutual aid agreements will dictate the terms and conditions of assistance and/or when those terms are activated. Other requests for assistance without prior authorization are determined by the activation status of the City of Orlando Emergency Operations Center. If the EOC is activated to a Level 1, requests for mutual aid will be made to the Emergency Manager. When the EOC is activated to a Level 2 or 3, requests will be made to the Emergency Manager with further approval from the CAO, and Fire Chief, as appropriate.

The requesting party shall be responsible for reimbursement of all authorized expenses to the assisting party. The assisting party shall bill the requesting party for all expenses

after they incurred and as soon as practicable, but not later than 60 days following the period of assistance. The deadline for identifying damage, however, may be extended in accordance with 44 CFR Part 206.

The assisting party shall maintain detailed records for a minimum of three years following project close out. The assisting party shall submit to the requesting party the appropriate FEMA summary forms along with invoices when requesting reimbursement.

Funding Agreements

Funding agreements between the City of Orlando and other legal entities shall be approved by the City Council and signed by the City Mayor. If funding agreements are issued between the State of Florida and the City, the Governor's Authorized Representative, usually the Director of the Florida Division of Emergency Management (FDEM), also signs the agreements for execution. Funding agreements provide supplemental Federal disaster grant assistance for the repair, replacement, or restoration of disaster-damaged, publicly owned facilities, and the facilities of certain private and/or non-profit organizations. The authority to expend funds for emergency management operations is contained in Florida Statute Chapter 252.

1. Funding Sources

Before, during, and following a disaster, there may be a variety of financial resources available to the City of Orlando to prevent, prepare, mitigate, respond to and recover from a disaster or emergency incident.

- a. Public Assistance (PA) Program provides Federal reimbursement funds to State and local governments to quickly respond to and recover from major disasters or emergencies. These supplemental funds are for several purposes, including the repair, replacement, or restoration of public facilities owned and/or operated by a government damaged by the disaster, debris removal, and emergency protective measures. In general, the Federal share for Public Assistance is not less than 75% of the eligible costs. The Florida Division of Emergency Management administers the PA Program and determines how the non-Federal share (up to 25%) is split with the eligible applicants.
- b. Hazard Mitigation Grant Program (HMGP) was authorized under Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act. The program provides grants to states and local government to implement long term hazard mitigation measures after a Presidential disaster declaration.

The overall purpose of the HMGP is to reduce the loss of life and property due to disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster in the affected areas. FEMA can fund up to 75% of the eligible costs of each project. The State or sub-grantee must provide a 25% match, which can be fashioned from a combination of cash and in-kind sources.

- c. State Homeland Security Grant Program (SHSGP) Funds from the Department of Homeland Security (DHS) supports the implementation of State Homeland Security Strategies to address the identified planning, organization, equipment, training, and exercise needs to prevent, protect against, mitigate, respond to, and recover from acts of terrorism and other catastrophic events. SHSGP funding is intended to improve the ability of state and local agencies to prevent and respond to terrorist attacks using chemical, biological, radiological, nuclear or explosive weapons.
- d. Urban Area Security Initiative (UASI) Funds from DHS's Office of Grants & Training are utilized to address unique planning, equipment, training and exercises needs in high-threat, high-density urban areas. Funds enhance and sustain the capability to prevent, respond to, and recover from threats or acts of terrorism.
- e. Emergency Management Preparedness and Assistance (EMPA) Funds are allocated from the Emergency Management Preparedness and Assistance Trust Fund created by the Florida Legislature in 1993 to implement necessary improvements in the State's emergency preparedness and recovery program and facilities.
- f. Emergency Management Performance Grant (EMPG) Funds are designated to the State and Counties to pay for statewide and local disaster prevention, preparedness, and mitigation, response, and recovery programs for all hazards.
- g. The Hazard Analysis Grant Funds originate from State to the Counties to identify and conduct on-site evaluations of facilities in the community that are housing hazardous materials considered Extremely Hazardous Substances (EHS).
- h. Metropolitan Medical Response System (MMRS) is funded by the DHS to support the integration of emergency management, health, and medical

- systems into a coordinated response to mass casualty incidents caused by any hazard.
- i. Community Emergency Response Team (CERT) funding is used to educates citizens about disaster preparedness for hazards that may impact their area and trains them in basic disaster response skills, such as fire safety, light search and rescue, team organization, and disaster medical operations.
 - j. Citizen Corps Grant funds promote volunteer service activities that support homeland security and community safety for several citizen groups. The mission of Citizen Corps is to harness the power of every individual through education, training, and volunteer service to make communities safer, stronger, and better prepared to respond to the threats of terrorism, crime, public health issues, and disasters of all kinds.
 - k. Pre-Disaster Mitigation Grant Program (PDM) funds are authorized under Section 203 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act. The program is designed to assist State and local governments in implementing cost-effective hazard mitigation activities before a disaster event that complement a comprehensive mitigation program.
 - l. Flood Mitigation Assistance Grant Program (FMA) provides funding to assist states and communities in implementing measures to reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insured under the National Flood Insurance Program (NFIP).
 - m. Fire Management Assistance Grant Program (FMAGP) is available to States, local and tribal governments, for the mitigation, management, and control of fires on publicly or privately owned forests or grasslands, which threaten such destruction as would constitute a major disaster. The FMAGP provides a 75% Federal cost share and the State pays the remaining 25% for actual costs.
 - n. Repetitive Flood Claims (RFC) Grant Program, under the Bunning-Bereuter-Blumenauer Flood Insurance Reform Act of 2004, was included as an amendment to the National Flood Insurance Act of 1968 to include up to \$10 million annually for FEMA to provide funds to assist states and communities in reducing flood damages to insured properties that have had one or more claims to the NFIP. FEMA may contribute up to 100% of the total amount

approved under the RFC grant award to implement approved activities, as long as the applicant has demonstrated that the proposed activities cannot be funded under the Flood Mitigation Assistance (FMA) program.

- o. Severe Repetitive Loss (SRL) Program under the Bunning-Bereuter-Blumenauer Flood Insurance Reform Act of 2004, was included as an amendment to the National Flood Insurance Act of 1968 to provide funding to reduce or eliminate the long-term risk of flood damage to severe repetitive loss structures insured under the NFIP. The SRL provides a 75% Federal cost share with the applicant paying the remaining 25%. States with FEMA approved Standard or Enhanced Mitigation Plans that include a strategy for mitigating existing and future SRL properties are eligible to receive up to 90% Federal cost-share funding for projects approved in states.

Processing and Maintaining Records

All City of Orlando departments and other governmental agencies must ensure the protection of their records during disaster situations. All agencies have the potential to receive official records of damage from fire, water, wind, vandalism, and other possible threats. The City of Orlando Office of Business and Financial Services is responsible for specific measures for protecting records of all expenditures and obligations for equipment resources, materials, and personnel as reflected in each agencies' disaster plan.

Those agencies with vital records must take special care to ensure the safety of these records. Off-site storage of duplicate vital records, whenever feasible, is strongly recommended. All agencies should also have plans that address the recovery of damaged records. All records, electronic and otherwise for disaster reimbursement will remain the property of the County except in the case of agencies filing directly as an applicant (sub-grantee).

The Florida Division of Emergency Management provides a Public Assistance Coordinator for more direction and assistance regarding mutual aid record keeping.

Reference and Authorities

Chapter 252 Florida Statues for City Government

As mandated by Florida Statue 252.38, municipal governments are responsible to:

- Authorize and encourage creating a municipal emergency management plan.
- Coordinate their activities with those of the county emergency management agency.
- Comply with laws, rules, and requirement applicable to county emergency management plan.
- Ensure the municipal emergency management plan is consistent with and subject to the applicable county emergency management plan.
- Coordinate requests to the state or federal emergency response assistance with its county.

Federal Statutory & Administrative Authorities

- The Robert T. Stafford Disaster Relief and Emergency Assistance Act (PL 100-707 which amended PL 93-288).
- Public Law 106-390, Disaster Mitigation Act of 2000.
- Post-Katrina Emergency Management Reform Act
- Homeland Security Act of 2002
- Homeland Security Presidential Direction #5
- Homeland Security Presidential Directive #8
- Presidential Decision Directive 39 (U.S. National Policy on Terrorism)
- Public Law 107 - 56 - (USA Patriot Act 2001)
- Public Law 93-234 - (Amended: Flood Disaster Protection Act of 1973)
- Public Law 101-615 - (Hazardous Materials Transportation Uniform Safety Act)
- Public Law 94- 499 - (Governs the planning of hazardous materials)
- Homeland Security Presidential Directive 5 (Management of Domestic Incidents)
- Homeland Security Presidential Directive 7 (Critical Infrastructure Identification, Prioritization, and Protection)
- Homeland Security Presidential Directive 8 (National Preparedness)
- FEMA N.I.M.S Basic: 501 Series
- FEMA National Response Framework

State Statutory & Administrative Authorities

- Florida Statute Chapter 1, Definitions
- Florida Statute Chapter 22, Emergency Continuity of Government
- Florida Statute Chapter 154, Public Health Facilities

- Florida Statute Chapter 163, Intergovernmental
- Programs, Part III Community Redevelopment
- Florida Statute Chapter 165, Title XII, Municipalities,
- Formation of Local Governments
- Florida Statute Chapter 166, Municipalities
- Florida Statute Chapter 252, Emergency Management
- Florida Statute Chapter 321, Highway Patrol
- Florida Statute Chapter 381, Title XXIX, Public Health
- Florida Statute Chapter 401, Medical Communications and Transportation
- Florida Statute Chapter 403, Environmental Control
- Florida Statute Chapter 404, Radiation
- Florida Statute Chapter 406, Medical Examiners
- Florida Statute Chapter 409, Title XXX, Social Welfare
- Florida Statute Chapter 427, Transportation Services
- Florida Statute 526.143 (Alternate generated power for motor fuel dispensing facilities)
- Florida Administrative Code, Section 27P

County Statutory & Administrative Authorities

- Orange County Ordinance 94-11, Emergency Management Ordinance
- Orange County Ordinance 2000-17, Emergency Management Ordinance
- Orange County Code Chapter 1, Administration
- Orange County Code Chapter 13, Fire Control and Prevention
- Orange County Code Chapter 21, Medical Examiner
- Orange County Code Chapter 24, Pollution Control
- Orange County Charter, January 1, 1987
- Orange County Administrative Regulations
- Orange County Emergency Operations Center Standard Operating Guidelines
- Orange County Disaster Emergency Purchasing Manual, 2007
- Orange County Local Mitigation Strategy
- Orange County Disaster Housing Plan
- Orange County Points of Distribution Plan
- Orange County Exercise Process Guidelines
- Orange County Logistical Management Strategy
- Orange County Hazard-Specific Guidelines for:
 - High Winds Wildland Fires
 - Drought Hail

- o Hazardous Materials Incidents Flooding
- o Lightning Loss of Electric Services
- o Telecommunications Disruptions Crime/Terrorism

City Statutory & Administrative Authorities

- City of Orlando Office of Emergency Management Strategic Plan
- City of Orlando Office of Emergency Management Mission and Vision
- City of Orlando Comprehensive Emergency Management Plan (CEMP)
- City of Orlando CEMP Annex A – Emergency Support Function
- City of Orlando CEMP Annex B – Recovery Operations
- City of Orlando CEMP Annex C – Disaster Preparedness Checklist (Pre)
- City of Orlando CEMP Annex C – Disaster Preparedness Checklist (Post)
- City of Orlando CEMP Annex C – Disaster Preparedness Checklist (No Warning)
- City of Orlando CEMP Annex D – Local Mitigation Strategy
- City Policy 135.1 OOC- Organization and Policy
- City Policy 135.2 OOC- Governing Board
- City Policy 135.3 OOC-Operating Procedures
- City Policy 808.13 Disaster Preparedness
- City Policy 500.3 Emergency Management Organization and Policy
- City Policy 500.4 Emergency Management Executive Policy Group
- City Policy 500.5 Emergency Management Team Organization and Policy
- City Policy 500.6 Disaster Planning

Supplemental Plans

These plans are used in unique situations and supplement the CEMP:

- Greater Orlando Aviation Authority
- Continuity of Operations Plan
- Debris Management Plan
- Sheltering Plan
- Post Disaster Redevelopment Plan
- Disaster Housing Plan
- Evacuation Traffic Plan
- Community Wildfire Protection Plan
- Temporary Housing Plan
- Traffic Management Plan
- Local Mitigation Strategy

- Regional Terrorism Response Plan
- Regional Inland Evacuation Plan

Shelter Management

The City of Orlando does not manage any shelter operations within the jurisdiction. However, the Office of Emergency Management coordinates with Orange County if there is a need to conduct shelter operations within the City. Because of its position in the State of Florida, Orange County serves as a host-county for a variety of hazards. Occasionally, the county shelters its citizens and visitors based upon the hazard and the potential impact(s) to the county. For more detailed information on sheltering in Orange County, please refer to the Orange County Sheltering Plan.

Shelter Operations

a. Impact-County Operations

This deals with the sheltering of County citizens and/or visitors. If there is an imminent impact to the City of Orlando, the City's Office of Emergency Management will request to the Orange County Office of Emergency Management for consideration of establishing shelters within the City limits. This will be facilitated by the use of General, Pet-Friendly, and People with Special Needs shelters as well as area hotels and motels.

b. Host-County Operations

Orange County is a potential destination for large numbers of evacuees from the coastal regions or other States. To adequately shelter these evacuees Orange County utilizes General and Pet-Friendly shelters and area hotels and motels.

c. Long-Term Sheltering

In the event that a long-term sheltering solution is needed, members of City of Orlando Emergency Management will coordinate with the Federal Government, the State of Florida, and local businesses and non-profit groups to meet the demands for sheltering. This type of long-term sheltering is addressed further within the Disaster Housing Plan.

Types of Shelters

a. General Shelters

These strategically placed hardened facilities are used to shelter the general public and include public and private facilities. These shelters are staffed and operated by the County ESFs 6 and/or 15.

b. People with Special Needs (PSNs) Shelters

These shelters service a particular segment of the population who need additional services before and after an incident. These facilities are hardened structures and strategically located throughout the County and are staffed and operated by ESF #8 Health and Medical.

c. Pet-Friendly Shelters

These hardened facilities are strategically placed throughout the county and are designed to shelter humans and pets in the same location. These shelters are staffed and operated by the County ESF #17 Animal Services.

d. Refuges of Last Resort

The possibility exists in a large-scale evacuation or disaster that traffic routes and/or existing shelters will be overloaded and there will be a need to shelter large numbers of individuals.

Refuges of last resort have been identified within Orange County. These refuges are or will be designated as official American Red Cross public shelters and will have minimal, if any, support available; they will merely serve to shelter motorists and/or individuals.

e. Cold Weather Sheltering

Sheltering against the effects of cold weather is coordinated by the City of Orlando Office of Emergency Management (OEM) as the area's homeless shelters are located within the city limits of Orlando.

When a "Cold Night" is designated, the Orange County Office of Emergency Management (OCOEM) will contact Orlando's OEM to establish a liaison role and verify support agency capabilities. A "Cold Night" is the term used when air and/or wind chill temperatures are forecasted to be below 40°F and serves to initiate special sheltering provisions among the area's three main support agencies.

These provisions include suspension of some of the normal admittance rules and regulations and opens up additional sleeping space above the normal "permanent resident" totals. Those support agencies involved include The Coalition for the Homeless, The Salvation Army, and The Orlando Union Rescue Mission.

Evacuation Management

An incident may require evacuations of individuals from within the City of Orlando or outside of the City. These evacuations may take two basic forms:

- Spontaneous evacuations are unplanned evacuation with little or no warning. This may involve a small number of individuals to an entire community.
- Planned Evacuations occur with advance warning (i.e., hurricane evacuations) and will most likely involve whole communities to entire regions of the United States.

Orange County currently has three plans that address evacuation scenarios: the inland evacuation plan, the Traffic Management Plan, and the catastrophic evacuation plan.

a. Evacuation Coordination Authority

An evacuation within the City of Orlando will be coordinated and or supported by the City of Orlando Office of Emergency Management.

b. Evacuation Routes

Neither Orange County nor the City of Orlando is within a storm surge evacuation zone. The routes identified within Orange County are designed to funnel evacuees from the coasts to shelters within the County. This process is identified in the Orange County Traffic Operations Manual for Coastal Evacuations. The major routes in this plan include:

- Interstate 4 State Route 528 Florida Turnpike
- State Route 50 John Young Parkway State Route 417
- U.S. 441

Re-Entry

Following a major incident, the City of Orlando is responsible for overseeing the safe and efficient re-entry of citizens forced to evacuate. Re-entry will be accomplished through the coordination with surrounding jurisdiction and the State of Florida and may require the use of Reentry checkpoints and roadblocks to control reentry. This process will also involve a number of phases, such as:

- First responders will re-enter the affected areas to conduct search and rescue, secure the area, and stabilize the affected areas.
 - Utility providers will need to secure the affected area(s) and begin repairing critical infrastructure as well as conducting damage assessments.
 - Once the impacted area(s) are deemed to be safe, citizens will be allowed to return to their homes to take up residency or collect personal belongings and begin the recovery process.

- o There are various ESFs and ECOs that may be involved in re-entry operations; these include:
 - ESF 1 - Transportation
 - ESF 18 - Business & Industry
 - ESF 19 - Damage Assessment
 - ESF 3 - Public Works
 - ESF 4 – Firefighting
 - ESF 6 - Mass Care
 - ESF 9 - Search & Rescue
 - ESF 10 - Hazardous Materials
 - ESF 12 – Energy
 - ESF 14 - Public Information
 - ESF 16 - Law Enforcement

Appendix A: ESF Acceptance of Responsibility Form

ESF Acceptance of Responsibility Form ESF # _____

The State of Florida is now mandating in the 2013 Comprehensive Emergency Management Plan (CEMP) an Acceptance of Responsibility form. This form serves as the agreement between the ESF's and Emergency Management.

1. The City of Orlando Office of Emergency Management (OEM) shall comply with applicable legislation, regulations, directives, and policies. Legal authorities provide flexibility and responsiveness to execute emergency management activities in emergency and non-emergency situations.
2. The intent of assigning City departments and partnering organizations as lead agencies for Emergency Support Functions (ESFs) is to ensure accountability by an agency for certain emergency actions that may occur before, during, and after a major disaster. While a department's preference is always considered, other critical factors affect the final assignment decision, including the current responsibilities of the department, the amount of available resources managed by the department, and the skill set of the department's staff.
 - **Level 3-Monitoring:** This involves OEM monitoring daily events and notifying members of the City of Orlando Emergency Management Team if an emergency and/or disaster require their support or resources.
 - **Level 2-Partial Activation:** This is a partial activation where only the incident-specific members of the City of Orlando Emergency Management Team will staff the EOC. The Emergency Manager can activate the EOC to Level 2 in consultation with the Executive Policy Group.
 - **Level 1-Full Activation:** This is full-scale activation. The EOC is fully staffed by the City of Orlando Emergency Management Team members. The Emergency Manager can activate the EOC to Level 1 in consultation with the Executive Policy Group.
3. ESF Lead Agencies are responsible for adhering to all policies, procedures, and responsibilities notated within the City of Orlando Comprehensive Emergency Management Plan. Each ESF Lead and Supporting agency is responsible for reviewing and updating their CEMP ESF Description in the Annex section and Checklist in the EOC Standard Operating Guide book.
4. Agreeing to accept these responsibilities indicates the department agency's willingness to support policies and procedures listed within ESF #_____. The CEMP will be updated annually and revised every 4-years.
5. It is incumbent upon each ESF to conduct a thorough review of all ESF responsibilities prior to June 1st each year.

I, _____ have read the above statements and agree to accept and abide by
(Department Director Print Name)

policies and conditions stated herein on behalf of my department/agency, _____.
(Department/Agency)

_____ / _____ / _____
(Department Director Signature)

_____ / _____ / _____
(Date)

_____ / _____ / _____
(Assigned ESF Lead)

_____ / _____ / _____
(Assigned ESF Alternate Lead)

Appendix B: Training Course Matrix



	Executive Policy Group (EPG)																		
	Emergency Coordination																		
	Liaison Officer (LNO)																		
	Public Information Officer																		
	Safety Officer (SO)																		
NIMS/ICS (Independent Study)																			
IS-700 National incident management System	O	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M
IS-800B National Response Framework	O	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M
IS-100 Intro to ICS	O	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M
IS-200 Basic to ICS	O	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M
IS-300 Intermediate ICS	O	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
IS-400 Advance ICS	O	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
NIMS/ICS Overview for Executive and Senior Officials G-402	R																		
Local EM Courses																			
Emergency Operations Center EOC-101	N	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M
Emergency Operations Center TTX EOC-102	N	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M
Field Operations Center FOC-101	N	O	N	N	N	O	N	O	O	N	N	N	N	N	N	N	N	O	N
Emergency Information Center EIC-101	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	M
Fiscal Operations Training											R						R		
American red Cross Shelter Manager ARC 107																			
PDS (Independent Study)																			
*IS230 Principle of Emergency Management	N	R	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
*IS235 Emergency Planning Course	N	R	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
*IS240 Leadership and Influence	N	R	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
*IS241 Decision Making / Problem Solving	N	R	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
*IS242 Effective Communications	N	R	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
*IS244 Developing Volunteer Resources	N	R	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
*IS247 Decision Making in Crisis	N	R	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
IS702 NIMS PIO Joint Information Center	N	R	O	R	O	O	O	O	O	O	O	O	O	O	R	O	O	O	O
APS (State Offered)																			

CITY OF ORLANDO
COMPREHENSIVE EMERGENCY MANAGEMENT PLAN

2019



	Executive Policy Group (EPG)												
	N	R	O	O	O	O	O	O	O	O	O	O	O
*G120 Exercise design Course	N	R	O	O	O	O	O	O	O	O	O	O	O
G130 Exercise Evaluation Course	N	R	O	O	O	O	O	O	O	O	O	O	O
G290 Basic PIO	N	R	O	O	O	O	O	O	O	O	O	O	O
G250.7 Rapid Assessment Planning	N	R	O	O	O	O	O	O	O	O	O	O	O
G601 Damage Assessment	N	R	O	O	O	O	O	O	O	O	O	O	O
G393 Mitigation for Emergency Manager	N	R	O	O	O	O	O	O	O	O	O	O	O
G386 Mass Fatalities	N	R	O	O	O	O	O	O	O	O	O	O	O
G275 EOC Management Operations	N	R	O	O	O	O	O	O	O	O	O	O	O
G276 Resource Management	N	R	O	O	O	O	O	O	O	O	O	O	O
G385 Disaster response and Recovery	N	R	O	O	O	O	O	O	O	O	O	O	O
G381 Public Assistance Operations	N	R	O	O	O	O	O	O	O	O	O	O	O
G250.11 COOP/COG	N	R	O	O	O	O	O	O	O	O	O	O	O
G191 ICS/EOC Interface	N	R	O	O	O	O	O	O	O	O	O	O	O
G195 Intermediate ICS	N	R	O	O	O	O	O	O	O	O	O	O	O
ICS Position Specific Courses													
Operations Chief	N	O	O	O	O	O	O	O	O	O	O	O	O
Planning Chief	N	O	O	O	O	O	O	O	O	O	O	O	O
Logistics Chief	N	O	O	O	O	O	O	O	O	O	O	O	O
Incident Commander	N	O	O	O	O	O	O	O	O	O	O	O	O
Public Information Officer	N	O	O	O	O	O	O	O	O	O	O	O	O
Liaison Officer	N	O	O	O	O	O	O	O	O	O	O	O	O
Safety Officer	N	O	O	O	O	O	O	O	O	O	O	O	O
All Hazards Incident Management Team	N	O	O	O	O	O	O	O	O	O	O	O	O
EMI Residence Courses													
E202 Debris Management	N	0	0	0	0	0	R	O	O	O	O	R	O
E273 Managing Floodplain Development	N	O	O	O	O	O	R	O	O	O	O	O	O
E363 Multi- Hazards Safety for Schools	N	O	O	O	O	O	O	O	R	O	O	O	O
E388 Advance PIO	N	O	O	R	O	O	O	O	O	O	O	O	O
E905 IEMC Hurricane Prep & Response	N	O	O	O	O	O	O	O	O	O	O	O	O

CITY OF ORLANDO
COMPREHENSIVE EMERGENCY MANAGEMENT PLAN

2019



E906 IEMC Hurricane Recovery & Mitigation	<input checked="" type="checkbox"/> Executive Policy Group (EPG)	<input type="checkbox"/> Emergency Coordination	<input type="checkbox"/> Liaison Officer (LNO)	<input type="checkbox"/> Public Information Officer	<input type="checkbox"/> Safety Officer (SO)	<input type="checkbox"/> ESF-01 Transportation	<input type="checkbox"/> ESF-02 Technology	<input type="checkbox"/> ESF-03 Public Works	<input type="checkbox"/> ESF-04 Firefighting	<input type="checkbox"/> ESF-05 Emergency	<input type="checkbox"/> ESF-06 Mass Care	<input type="checkbox"/> ESF-07 Procurement	<input type="checkbox"/> ESF-08 EMS	<input type="checkbox"/> ESF-09 Search & Rescue	<input type="checkbox"/> ESF-10 HAZMAT	<input type="checkbox"/> ESF-11 Food & Water	<input type="checkbox"/> ESF-12 Utilities	<input type="checkbox"/> ESF-13 Military Support	<input type="checkbox"/> ESF-14 Public Information	<input type="checkbox"/> ESF-15 Volunteer and	<input type="checkbox"/> ESF-16 Law Enforcement	<input type="checkbox"/> ESF-18 Business & Industry	<input type="checkbox"/> ESF-19 Damage Assessment	<input type="checkbox"/> ESF-20 Facilities	<input type="checkbox"/> Emergency Information	<input type="checkbox"/> Field Operations Center
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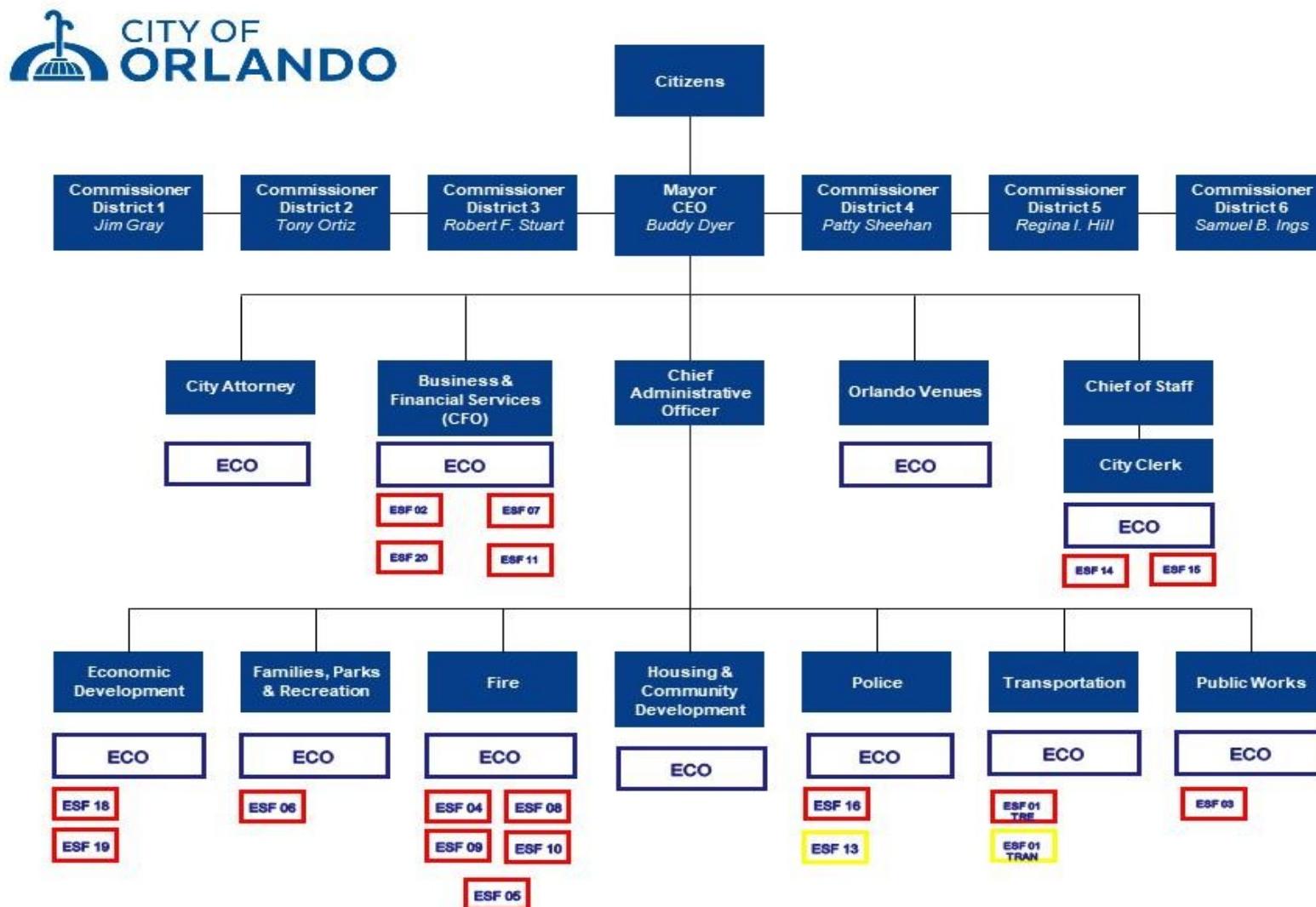
M=Mandatory

R= Recommended Training

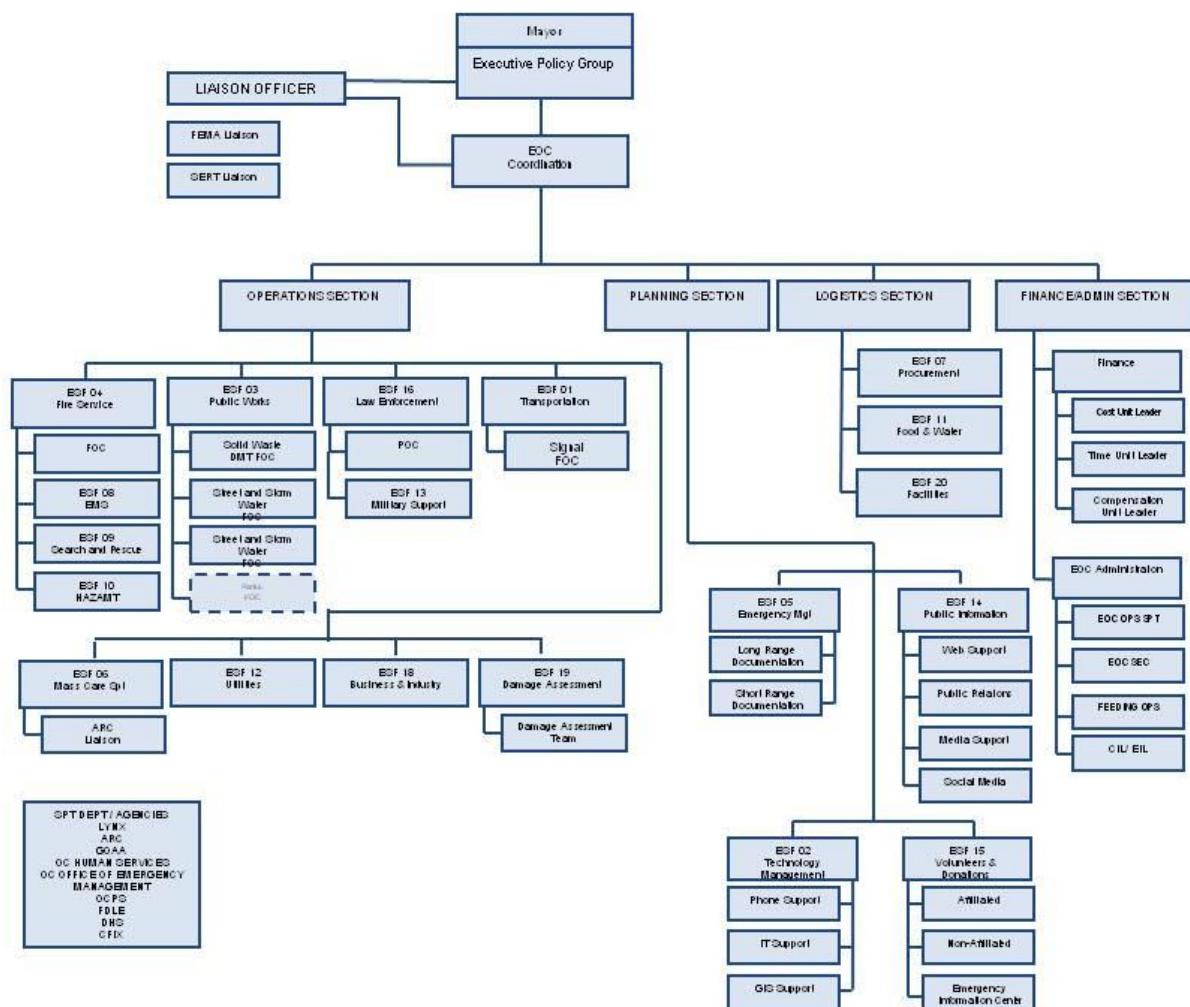
O=Optional Training

N=Not Applicable

Appendix C: Emergency Management Team



Appendix D: NIMS Integration



Annex I: Recovery Functions

Introduction

Purpose

The Recovery Annex establishes how the City of Orlando will recover from emergencies and/or disasters in the short and long term. This plan will address:

- Debris Management
- Damage Assessment
- State and Federal Assistance Programs
- Unmet Needs

Planning Assumptions

1. Emergencies and/or disasters will cause significant damage to the City of Orlando and will severely damage homes, businesses, and infrastructure.
2. A disaster will leave large areas of the county without power, water, and wastewater services for long periods.
3. Significant amounts of debris that must be processed and disposed of safely as a result of the disaster.
4. Following a disaster, surveying the extent of the impact will be hampered by blocked roads and damaged infrastructure.
5. State and Federal assistance will not address all of the needs of the community and will require creative solutions with assistance from community and faith-based organizations.

Phases of Recovery

1. Short Term Recovery

This phase involves the City of Orlando Emergency Management Team efforts to restore utilities and address the short-term needs of citizens and visitors. The time frame for short-term recovery is days to a week after an emergency and/or disaster.

2. Long Term Recovery

Long-term recovery can take place weeks, months and years after an emergency and/or disaster or it could begin immediately after an emergency. Long-term recovery includes issues not normally resolved or addressed in the Individual Assistance program (Long-term housing, mental health counseling, etc). This effort is facilitated by the Office of Emergency Management and coordinated by the City's Long-Term Recovery Task Force. The EOC is generally not activated during this phase.

Organization and Responsibilities

Short Term Recovery EOC Organization

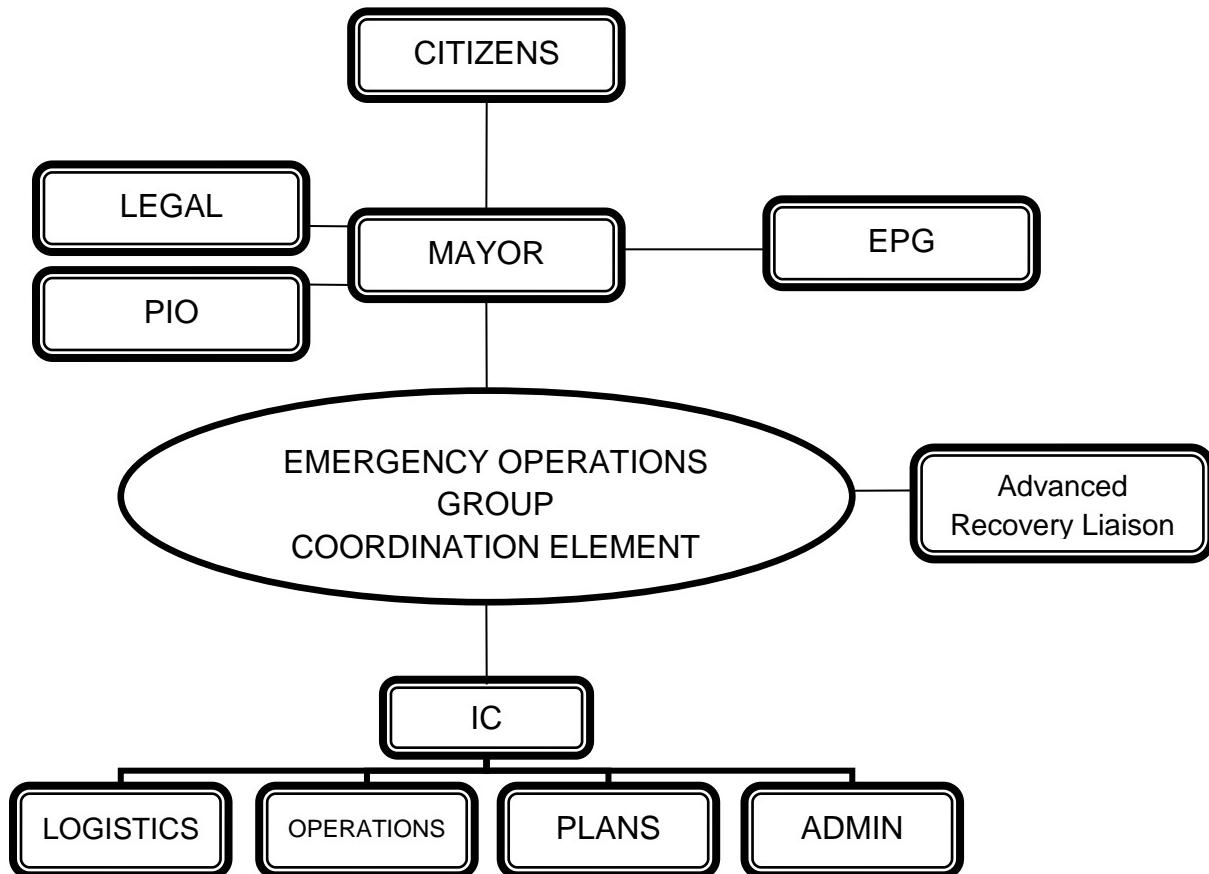
The EOC during this phase is structured according to the National Incident Management System. The Emergency Manager has the overall responsibility to facilitate and oversee the recovery efforts within the City of Orlando. Management of the recovery process is divided into two phases, which are:

- Emergency Manager
- Executive Policy Group
- EOC Coordinating Element: Composed of the Office of Emergency Management which serves as the primary recovery agency, ESFs 3, 18, & 19
- Operations Section: Consists of ESFs 1,3, 4, 6, 8, 9, 10, 12, 13, &16
- Planning and Information Section: Consists of ESFs 2, 5,14, & 15
- Logistics Section: Consists of ESFs 07,11 & 20
- Finance/Administration Section: Consists of the City of Orlando Office of Business and Financial Services

The Priorities of the City of Orlando EOC in this phase include but not limited to:

- Immediate life safety needs of citizens and visitors
- Road clearing operations
- Coordinate Ice and Water distribution
- Restoration of the critical infrastructure (electricity, water, gas, etc.)
- Debris Removal operations

Figure T: Short Term Recovery Organization in the EOC



1. Emergency Manager

The Emergency Manager has the overall responsibility to facilitate and oversees the recovery efforts within the City of Orlando. The short term recovery effort through the City of Orlando is coordinated from the City's Emergency Operations Center. The Executive Policy Group will be briefed daily on these efforts.

2. Primary Agency

The Office of Emergency Management is responsible for facilitating all short term recovery efforts.

3. Support Agencies

Each City of Orlando Emergency Management Team member is responsible for conducting or supporting recovery activities in the City of Orlando following a disaster. This process will involve a variety of missions for short and long term recovery. It is important to note that the majority of these actions will be the same regardless of a disaster declaration being issued or not.

a. ESF 1 - Transportation

- Coordinate and advise of the status and conditions of the roadways throughout the City of Orlando.

b. ESF 2 - Communications

- Coordinate communications assets from the government, the telecommunications industry, federal and state agencies, and private vendors to meet all response and recovery communications needs
- Ensure communications are established with other governmental agencies, shelters, feeding sites, staging areas, and other vital recovery sites as deemed necessary in support of other ESFs.

c. ESF 3 - Public Works

- Coordinate debris removal on essential transportation routes, public property, waterway, and critical public facilities. This includes emergency clearance (first push), permanent removal, staging, processing, disposal, and debris monitoring of all debris from public property.
- Prioritize and implement temporary emergency structural repairs at essential public facilities, city roads, bridges, and drainage systems, and other vital infrastructure components.
- Ensure open traffic corridors for the safe and efficient movement of emergency vehicles or evacuations and reentry of threatened populations.

d. ESF 4,8,9,10 - Firefighting, EMS, Search and Rescue, and Hazardous Materials

- Mobilize, manage and coordinate personnel, equipment and supplies in the detection and suppression of fires.
- Coordinate the activities of Orlando Fire Department resources during disaster scenarios to accomplish incident objectives.

- Provide for the safety and health of all emergency personnel by providing logistical support, food, shelter, and medical care. ESF #4 will interface with ESF #7/11 for logistical support operations.
- Establish staging areas and logistical support bases (if required) for requested mutual aid resources in coordination with all first response agencies.
- Plan, coordinate, and conduct and implement search and rescue operations in disaster-impacted areas following established procedures based on life safety and available resources.
- Coordinate with disaster response partners for the transportation of victims.
- Detect, identify, respond to, contain, and coordinate disposal of hazardous materials posing a threat to public health or safety.

e. ESF 5 - Emergency Management

- Support response and recovery operations through Incident Action Plan, Situation reports, Emergency Operations Center (EOC) briefing, conference call, intelligence gathering.
- Coordinate the processing and display of response and recovery information through the use of the City's Disaster Management Information System (WebEOC), Geographic Information System (GIS) technology, other audiovisual display, and other media.
- Consolidate key information into situation and technical data reports along with documenting overall response activities and operations.

f. ESF 6 - Mass Care

- Coordinate with Orange County and support Mass Care efforts.
- Support any aspects of hosting and risk shelter operations for evacuees and disaster victims.
- Conduct disaster assessment survey in impacted areas.
- Coordinate with Orange County for family services support to disaster victims, including casework, counseling, and disbursement of vouchers for emergency housing, food, maintenance, building and repair supplies, household furnishing, medical supplies, medical needs, and occupational supplies and equipment.
- Coordinate the establishment and operations of mass feeding facilities in areas affected by disasters and coordinate with disaster response partners for the provision of food, water, and ice to disaster victims.

- Maintain the Family Wellbeing inquiry and provide disaster welfare information regarding individuals within the impacted areas to reunite families.
- Coordinate the provision of emergency aid in shelters, fixed feeding sites, and emergency first aid stations.

g. ESF 7 - Procurement

- Identify, locate, and procure commodities and services as detailed in local emergency purchasing procedures.
- Assist and coordinate transport, stage, track, mobilize, document, and demobilize all resources (commodities and services) necessary to support disaster response operations of the City of Orlando.
- Establish areas for staging, storing, and distributing warehoused supplies, goods, or other resources as needed.
- Coordinate maximum use of the internal and external personnel, supplies, and equipment.
- Ensure appropriate financial tracking of these materials from the moment the resource is requested through the demobilization phase.

h. ESF 11 - Food and Water

- Assist in the coordination of emergency relief supplies including food, water, and ice to disaster victims utilizing congregate feeding sites, mobile feeding units, and Points of Distribution as determined by the city.
- Support emergency housing/sheltering operations by proving logistical support to include food, water, and sanitation as needed.
- Based on incoming information, prioritize the most devastated area first with basic emergency relief supplies.

i. ESF 12 - Utilities

- Assess damage to the energy system and evaluate energy demand and supply
- Support the rapid restoration of the energy system with consideration to priority locations.
- Identify and allocate all local government interim energy sources to support the continuation of critical services, citywide restoration efforts, and public building.

j. ESF 13 - Military Support

- When directed by the Governor or the State Coordinating Officer, the Adjutant General of Florida employs Florida National Guard personnel and equipment, through appropriate commanders to assist civil authorities.
- Active federal forces used during disaster relief will be under the command of and directly responsible to their military chain of command.
- All mission requests for military resources must be directed to the SEOC upon exhaustion of local resources.
- Military resources may be utilized for a variety of mission tasking to assist Emergency Support Functions.
- In coordination with the SEOC, ESF 13 will conduct a rapid impact assessment of the impacted area and disseminate impact assessment data.

k. ESF 14 - Public Information

- Provide accurate, timely, and coordinated information to all available media outlets during a disaster event.
- Coordinate response and recovery information from all City government entities to ensure consistency and accuracy.
- Coordinate the establishment of a Joint Information center in compliance with established procedures.

l. ESF 15 - Volunteer and Donations Management

- Serve as the central point of coordination for recruitment, registration, classification, training, and assignment of volunteers before and after a disaster in support of response and recovery operations as well as unmet needs projects.
- Coordinate and refer to other disaster response partners the collection, tracking, consolidation, storage, and distribution of relief supplies and donated goods that arrive in, or are made available to the community-wide response and recovery effort.
- Coordinate with existing volunteer and disaster relief agencies serving the City of Orlando to ensure efficient resource utilization and to avoid duplication of services.

m. ESF 16 - Law Enforcement

- Establish traffic Control points to monitor and manage and support evacuations, and re-entry in conjunction with other law enforcement agencies, and provide security and control access to designated impacted areas.

- Enforce curfews as established by an emergency declaration or executive order.
 - Provide security protection at designated response and recovery sites and in support of appropriate response recovery mission assignments.
 - Support next of kin notification.
 - Support staging areas and logistical support bases for requested mutual aid resources in coordination with all first response agencies.
- n. ESF 18 - Business and Industry
- Develop operational procedures and coordination protocols to assess damage and long term impact on the business community in the City of Orlando.
 - Coordinate with local chambers of commerce and business associations to establish operational procedures with locally owned and operated business which expedite business recovery resumption for the private sector.
 - Define policies to expedite post-disaster recovery and redevelopment for the private sector.
 - Identify coordination mechanism to link local businesses to private and public sector sources of financial and recovery solutions.
 - Foster contingency plans for innovative methods of re-supply, distribution communication, and transport.
 - Develop operational procedures to reach out to neighborhood organizations through direct contact and conduct an impact assessment to identify areas in need of response and recovery assistance.
- o. ESF 19 - Damage Assessment
- Coordinate damage assessment data for public assistance eligible facilities in compliance with the Federal Stafford Act.
 - Coordinate damage assessment data for private homes and businesses in compliance with the Federal Stafford Act.
 - Coordinate mutual aid assignments.
- p. ESF 20- Facilities
- Coordinate the damage assessment data for all public facilities in compliance with the federal Stafford Act.
 - Prioritize and implement temporary emergency structural repairs at vital public facilities.

- Provide technical advice and evaluation, engineering services, construction management and inspection, operations, and emergency contracting to sustain these activities.

4. Emergency Coordinating Officer (ECO)

The Emergency Coordinating Officer is the representative of their respective department and Department Directors in matters and coordination issues in reference to emergency management. Each city department has a designated Emergency Coordinating Officer (ECO).

5. State Emergency Response Team Liaison (SERT Liaison)

This position is normally staffed by a Florida Division of Emergency Management employee. During EOC activation they are located with the EOC Operations Desk and serve as the city's advocate to the State in acquiring needed supplies and resources.

6. State Advanced Recovery Liaison

A Florida Division of Emergency Management staff member will fill this position. Their responsibilities include:

- Coordinating with Emergency Management in on-going State recovery actions.
- Assisting in the rapid acquisition of Initial/ Preliminary Damage Assessment information.
- Identifying areas of high impact.

7. Federal Liaison

The Federal Emergency Management Agency may deploy personnel to the City EOC. This representative would work in concert with the SERT Liaison and/or the Advance Recovery Liaison at the EOC Operations Desk. Their role in the OC is to act as an advocate and liaison with the Federal government.

8. Joint Field Office (JFO)

The JFO is a temporary Federal/State multiagency coordination center established locally to facilitate field level domestic incident management activities related to prevention, preparedness, response, and recovery. The JFO provides a central location for coordination of the Federal, State, local, tribal, nongovernmental and private sector organizations with the primary responsibility for activities associated with threat response and incident support.

Short-Term Recovery Position

1. Debris Management

a. Debris Management Coordinator

The Mayor or the Chief Administrative Officer will designate the City's Debris Management Coordinator. The City of Orlando Public Work Solid Waste Manager is responsible for coordinating debris management activities prior to and following an emergency and /or disaster. This individual will serve as the coordinator of Federal/State debris management assistance.

b. Debris Management Task Force

This task force is chaired by the City of Orlando Public Work Solid Waste Manager. It is composed of the following department and/or divisions:

- Public Works
- Office of Emergency Management
- Parks and Recreation
- Code Enforcement
- Building Division
- Office of Communications & Neighborhood Relations

This workgroup is responsible for directing the activities of the agencies involved and the debris management contractors prior to and following an emergency and/or disaster.

2. Damage Assessment

a. Damage Assessment Coordinator

The Mayor or the Chief Administrative Officer will designate the City's Damage Assessment Coordinator. ESF #19 - Damage Assessment serves as the lead function for conducting the Initial Damage Assessment and supporting the Preliminary Damage Assessment. Their responsibilities include:

- Coordinate the completion of the Initial Damage Assessment
- Assist the State of Florida and the Federal Government in completing the Preliminary Damage Assessment.

ESF #19's primary agency is Code Enforcement and Building Division. They are responsible for estimating the cost of property damage. The Building Division is responsible for assessing post-disaster habitability inspections. In the field, these

two agencies work in teams to assess cost and habitability in unison. Public Works Capital Improvement is responsible for all public infrastructure.

b. Coordinating Agencies

Each department is responsible for assessing damage to its facilities. This information will involve both the Initial Damage Assessment and the Preliminary Damage Assessment. The supporting agencies include:

- ESF# 3-Public Works
- ESF# 20- Facilities
- ESF#19- Damage Assessment
- ESF#14- Public Information
- Office of Emergency Management

3. Public Assistance

a. Local Public Assistance Coordinator

The Mayor or the Chief Administrative Officer will designate the City's Public Assistance Coordinator. In this role he/she has the following responsibilities:

- Implementing and coordinating the PA process within the city.
- Provide facilitation services to the city departments/division during the process
- Compiling and verifying all project worksheets before submittal to FEMA

b. Support Agencies

These agencies support the Local Public Assistance Coordinator in the Public Assistance process. They include the following:

- City of Orlando Department/Divisions

Their responsibilities include:

- Identifying eligible projects
- Completing the FEMA Project Worksheets and submitting them to the Local Public Assistance Coordinator
- Assisting the Local Public Assistance Coordinator with the compiling and verification of project worksheet.

4. Local Mitigation Strategy Workgroup

The Mayor or the Chief Administrative Officer will designate the City of Orlando's Local Mitigation Strategy Workgroup Coordinator. This workgroup is composed of City of Orlando government, non-governmental, and private sector representatives. The City of Orlando is a member of the Orange County Local Mitigation Strategy Workgroup. Under Rule 9G-22 they are responsible for administering the Local Mitigation Strategy and overseeing the submittal of projects under the Hazards Mitigation Grant Program (HMGP).

a. Steering Committee

This committee is responsible for selecting projects and prioritizing them for funding under HMGP.

b. Planning Committee

This committee makes recommendations on what is eligible HMGP projects and provides technical review of projects under consideration.

5. Community Relations

a. Community Relations Coordinator

The Mayor or the Chief Administrative Officer will designate the City's Community Relations Coordinator. In this role, he/she will coordinate the dispatch and activities of these teams with the Federal and State government. He/she is also responsible for coordinating the deployment of these teams with the City impacted areas.

b. Community Partners

The City's Community Relations Coordinator will contact key community leaders and organizations; some of these include:

- Mayor's Council of Clergy
- City of Orlando CERT members
- Mayor's Veteran Advisory Group Neighborhood and Community Affairs
- Housing Department
- Hispanic Office of Local Assistance (HOLA)

c. Community Relations Team

The Community Relations Team (CRTs) is composed of the Federal, State and City agencies that will identify and serve the needs of citizens impacted by the disasters. CRT responsibilities and duties include:

- Informing affected individuals of the assistance programs that are available to them.
- Identifying the status of community resources and needs (housing, food, running water, etc)
- Confirming that civilians recovering from a disaster are provided with appropriate services (sheltering, food, mental health, etc)

Long Term Recovery

The long term recovery process takes place after the EOC has returned to Level 3 (Monitoring) phase.

1. Long Term Recovery/ Unmet Needs Coordinator

The Mayor or the Chief Administrative Officer will designate the City's Long Term Recovery / Unmet Needs Coordinator. His/her responsibilities include:

- Coordinating with the Federal and State government in assistance currently availability and identifying shortfalls.
- Coordinating with the various governmental, private sector and non-governmental organizations that may be involved in the long-term recovery process.
- Overseeing the process to address the unmet needs of our citizens and visitors.

2. Long-Term Recovery/Unmet Needs Organization

- American Red Cross of Central Florida
- Tri-County Volunteer Organization Active in Disasters (Tri-County VOAD)
- Florida Interfaith Network in Disasters
- Catholic Charities
- City of Orlando Housing Department
- City of Orlando Office of Communications & Neighborhood Relations
- City of Orlando Office of Community Affairs
- City of Orlando Office of Emergency Management
- Other Disaster Response Partners

3. Disaster Housing Coordinator

The City of Orlando Housing Director serves as the City's disaster housing coordinator. They are responsible for facilitating and coordinating the placement of disaster victims in short and long term housing solutions following a disaster.

Concept of Operations

Response / Recovery Transition

The CEMP Basic Plan addresses the City's activities in the preparedness and responses phases, while the Recovery Annex addresses recovery operations. The transition between response and recovery will be coordinated and directed through the City of Orlando Emergency Operations Center.

1. Transitional Phase

The response phase of the city's response to an emergency and/or disaster is typically comprised of search and rescue and other life-saving activities, initial sheltering of affected populations and initial debris clearances from major roadways. Recovery can sometimes begin occurring while response activities are still underway. Recovery is marked by assessment and restoration of critical infrastructure, additional clearance of debris from affected side streets, evaluating the need for longer-term sheltering of affected populations and coordination with the State and Federal government to distribute needed assistance to citizens.

2. Obtaining and administering State and Federal Assistance

This process is begun by the Mayor when he/she signs an executive order declaring a State of Local Emergency. Once this is completed the State can offer more assistance to the county and eventually and if needed request a Presidential Disaster Declaration through the Federal Emergency Management Agency, Regional Office.

Situation Awareness

1. EOC Situation Report

This document serves as the principal report in which all relevant information will be included. The report is compiled by ESF #5 Emergency Management (Information and Planning). The relevant information includes:

- Government Services Status
- Status of the transportation infrastructure
- Number 911 and EIC calls received
- Total amount of debris removed
- Amount of debris processed
- Location and hours of operations for citizen and contractor debris sites
- Location and hours of operations for Point of Distribution
- Location of Emergency Shelters
- Status of hospitals

- Location and hours of operations for Feeding and/or Comforting Station locations
 - Power Restoration Status
 - Location and hours of operations for Volunteer Reception Center
 - Reports of major business disruption
 - Results of the Initial Damage Assessment
 - Boil water notices in effect
2. Geographic Information System
- This system is maintained by ESF #5 (GIS) and serves as the City's Geographic Information System (GIS). All relevant information on the response and recovery to an emergency and/or disaster is included in this system

Municipal Coordination

1. Short Term Recovery

The Office of Emergency Management will maintain lines of communications with the Orange County Office of Emergency Management. During EOC activation the City of Orlando will post a City Liaison (LNO) at the county EOC. The LNO serves as a representative of the City of Orlando EOC and assists in the coordination efforts.

2. Long Term Recovery

During this phase, the Office of Emergency Management will coordinate directly with the county EOC.

Joint Field Office (JFO)

The City of Orlando EOC will work with Orange County, State of Florida and the Federal government through the JFO to coordinate the following missions:

- Deployment of Community Relations Teams
- Application and implementation for Public and Individual Assistance grant
- Identifying and addressing the unmet needs of the City of Orlando

Debris Management

1. Goals

The debris removal efforts will focus on clearing major transportation routes to allow for the movement of emergency vehicles, traffic, emergency resources and

supplies. After major transportation routes have been cleared, debris will then be removed from secondary roadways, residential streets, public works and other areas identified throughout the city.

2. Debris Management Contract

These contracts are required by the Federal Government. The City of Orlando utilizes two types of contracts, which are:

- Disaster Debris Monitoring Services: This contract is responsible for monitoring the work of the Disaster recovery and Debris Removal contractors.
- Disaster Recovery and Debris Removal: this contract is responsible for the collection, reduction, and disposal of the debris created by a disaster.

3. Collection and Disposal

a. Collection

The collection of disaster debris is coordinated between ESFs 3 and the Disaster Recovery & Debris Removal Contractors. The following facilities are used to collect this debris:

- Debris Processing Sites: these locations are pre-identified annually and may consist of city-owned property, and private sites with signed agreements, etc. Following a disaster, these sites may be operated by the City of Orlando or the Disaster Recovery and Debris Removal contractors.
- Roll-Off Sites: These are operated by the Disaster Recovery and Debris Removal contractor. They are operated at selected locations which are typically park sites.

b. Disposal

To minimize the impact on the remaining landfill capacity, alternative means of disposal will be used whenever possible. Vegetative debris will either be burned or chipped at ESF#3 pre-identified burn sites.

Constructive debris should be separated and disposed of accordingly. Appliances, for example, should be stockpiled (rather than taken to a landfill) until necessary arrangements can be made for disposal.

This committee is responsible for selecting projects and prioritizing them for funding under HMGP.

c. Planning Committee

This committee makes recommendations on what is eligible HMGP projects and provides technical review of projects under consideration.

Damage Assessment

In all cases, the mission of the local, State and FEMA damage assessment teams is to:

- Assess the extent of damage to individual homeowners and businesses
- Assess the extent of damage to public facilities
- Assess the extent to which the immediate emergency needs of the public are being met and the need for additional State assistance

1. Initial Damage Assessment

Once emergency conditions subside, ESF #19 - Damage Assessment will conduct the Initial Damage Assessment (IDA). This assessment will determine if the damages from a disaster require State and Federal disaster declarations.

2. Preliminary Damage Assessment

- a. Once the local state of emergency has been declared, the initial damage assessment is transmitted to the State EOC. A Preliminary Damage Assessment (PDA) will be needed if Federal assistance will be requested. A PDA is conducted by the State and FEMA to verify the severity of the impact and justify the need to pursue a request for Federal assistance. If a PDA is initiated, ESF 19 should be prepared to accompany the Federal/ State teams.
- b. The role of the State and FEMA PDA teams will be to verify the results of the initial damage assessment. Upon arrival, State and FEMA damage assessment teams will meet with local officials and be briefed on the results of the initial damage assessment. Members of the City of Orlando ESF 19 will need to accompany the PDA teams to survey the impacted areas.
- c. In the event of a catastrophic disaster, a damage assessment can be conducted after the Presidential Disaster Declaration. The assessment would be used as a tool to guide the overall recovery effort.

- d. The PDA can be conducted through a number of different methods that can be utilized depending on the situation; these include:
 - Aerial Reconnaissance- This method will be implemented using fix-wing and rotary aircraft to assess a large area or because access to the affected area is blocked.
 - Windshield Survey- This method involves damage assessments team driving around an affected area to record the number of homes and businesses damaged or destroyed. It is used to quickly assess the extent of the damage in a relatively short amount of time.
 - Walk-through- This method is the most thorough in assessing damages. It will involve the use of damage assessment teams walking through disaster-affected areas and categorizing damages to homes and businesses. This type of assessment is critical before a Federal declaration can be implemented.

3. Economic Impact Assessment

In the City of Orlando accessing the extent and magnitude of the impact to the business and industrial sector is accomplished through the partnership between ESF #18- Business and Industry and ESF #19- Damage Assessment. ESF#18 will serve as the lead agency in assessing the economic impact on businesses in the affected area.

4. Data Collection and Reporting

a. Data-Collection

ESF#19 utilizes FEMA's categories and requirements in collecting damage assessment information.

b. State Reporting

Once the IDA is completed and finalized, ESF#19 submits into the Orange County Office of Emergency Management EOC Operations Desk. The EOC Operations Desk is then responsible for submitting this information to the State EOC through WebEOC, e-mail and/or verbally on the statewide conference call.

Local and State Assistance

1. City Assistance

The City of Orlando does not have a fund set aside to provide public or individual assistance in disasters. The City of Orlando will provide the maximum amount of assistance to citizens whether the disasters are declared or undeclared. The City of Orlando depends on the assistance that non-governmental agencies can provide, such as from the Salvation Army and American Red Cross.

2. County Assistance

The City of Orlando will coordinate any assistance required with the Orange County Office of Emergency Management.

3. State Assistance

Chapter 93-128, Law of Florida, establishes the Emergency Management Preparedness and Assistance Trust Fund (Trust Fund) to support State and local emergency management activities. The Trust Fund is funded through an annual surcharge imposed on homeowners and business insurance policies. Twenty percent of the Trust Fund is reserved, by Statute, to provide for State relief assistance for no-Federal declared disaster, including, but not limited to, grants and below-interest rate loans to businesses for uninsured losses resulting from disasters.

Federal Assistance

The Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), Public Law 93-288, as amended by the Disaster Mitigation Act of 2000 (DMA2K) was enacted by the Congress of the United States to supplement the efforts of State and local governments during and after a Presidential Declaration for disasters. The Stafford Act as amended by the DMA2K was not intended to provide 100% reimbursement for all damages incurred during disasters but permit Federal Assistance, when the State and local governments have exhausted their resources and capabilities. These are several forms of Federal disaster assistance not included in the Stafford Act:

- Search and Rescue (U.S. Coast Guard)
- Flood Protection (U.S. Army Corps of Engineers)
- Emergency Food Programs (U.S. Department of Agriculture)
- Small Business Administration Loans

1. Individual Assistance

This program assists individuals and families recovering from disasters. The different components of this program are:

- Small Business Administration loans
- Temporary Housing
- Individual and Family Grant Programs
- Disaster Unemployment Assistance
- Farm Service Agency Assistance
- Income Tax Service Assistance
- Food Coupons
- Disaster-Related Stress Management

2. Public Assistance

a. Planning Assumptions

- The cost share for the public assistance program may vary depending on the severity of the disaster.
- Eligible candidates include State and local agencies/organizations, medical facilities, custodial care facilities, emergency facilities, etc.
- The public assistance program is a cooperative effort between local, State and Federal officials, so interagency planning and coordination are critical.

b. Pre-Identification of Applicants

The Office of Management and Budget pre-identifies applicants by past disaster history and county departments/divisions that are assigned responsibility before and following an emergency and/or disaster.

c. Process

The Office of Management and Budget and the eligible agencies and/or organization will take the following steps to identify and funds projects:

- Review the payroll of the agency and/or organization in question and determine what is eligible for reimbursement through this program
- Utilize the IDS and PDA determine the level of damage to eligible facilities

- Review the City general fund and other accounts to determine the amount of funds that can be used for the local shares of the public assistance program

This program provides supplemental Federal disaster grant assistance for debris removal, emergency protective measure, and the repair, replacement, or restoration of disaster-damaged, publicly owned facilities and the facilities of certain private non-profit (PNP) organizations. The PA program also encourages protection of these damaged facilities from future events by providing assistance for hazard mitigation measures during the recovery process.

As a grantee, the State of Florida is responsible for administering the PA program. The role of local governments and eligible private nonprofit organizations is to prepare the scope of work and cost estimates for their projects. They will also work with the State and FEMA to provide necessary documentation.

Following the President's declaration of a disaster, the Governor's Authorized Representative (GAR) will conduct meeting for all potential applicants for public disaster assistance. FEMA will assign a Public Assistance Coordinator who will be the overall coordinator of the program. FDEM will assign an Applicant Liaison Office to assist the individual applicants. The Public Assistance Coordinator will act as the administrator for Federal funds in regards to federal disaster funds.

3. Hazard Mitigation Grant Program

The Hazard Mitigation Grant Program is authorized by Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (PL 93-288 as amended). It is a partnership that is designed to assist States, local governments, private non-profit organizations and Indian Tribes in implementing long-term hazard mitigation measures following a major disaster declaration.

The objectives of the Hazard Mitigation Grant Program are:

- To prevent future losses of lives and damage to property due to disasters.
- To implement State or local hazard mitigation plans.
- To enable mitigation measures to be implemented during immediate recovery from a disaster.
- To provide funding for previously identified mitigation measures that benefit the disaster area.

The Florida Division of Emergency Management manages this program according to Florida Administrative Code 9G-22.

Human Needs

1. Community Relations

The CRTs are dispatched to locations within the City of Orlando that are without power that may be unaware of the Disaster Recovery Center or available Individual Assistance programs. Their deployment is based on direction and input from the City EOC, statistics of individual which has not visited DRCs or called the National Registration number for IA, are with special populations (migrant workers, disabled individuals, etc), and input from local community leaders and organizations, such as:

- Local Churches
- Community Leaders
- Political Leaders
- Non-Governmental Organizations

2. Disaster Recovery Centers

Once a Presidential Disaster Declaration has been issued, the Emergency Manager in cooperation with the Executive Policy Group will request from the State EOC the establishment of the DRCs in the City of Orlando.

a. Pre-Identification

The City of Orlando has pre-identified fixed and mobile sites throughout the city. The list of these sites is updated each year by the Office of Emergency Management and forwarded to the County OEM and FDEM.

b. Mobilization

The City of Orlando will request the opening of DRCs from the State thru the County. The State of Florida and FEMA will then coordinate the opening announcement and staffing of these centers with the County and the city EOC. DRC hours of operations statewide will be determined jointly by the State and Federal Coordinating Officers. The City of Orlando will maintain constant representation in the DRC and OEM will act as the overall facilitator in cooperation with the State and Federal government on the overall operation and coordination of the DRC. Once the DRC is activated OEM will notify the appropriate agencies/organizations.

c. Management

The State of Florida and FEMA jointly manage the DRCs. Individual DRCs are managed by a DRC manager who is either a State employee or a Federal employee.

d. Local Information Referral Resources

The following agencies and/or organizations may have a representative within the Disaster Recovery Center; these include:

- 311 Center
- American Red Cross
- 211 Community Resources

e. Demobilization

In cooperation with City of Orlando, Orange County EOC, the State EOC, and FEMA will begin to demobilize the DRCs. The decision to demobilize is based on the following factors:

- Numbers of individuals utilizing the DRCs
- Guidance and direction from the JFO
- Restoration of critical infrastructure (water, wastewater, electricity) to the affected areas

3. Short and Long Term Housing Assistance

Short term and long term housing will be coordinated through FEMA and Florida DEM. The City of Orlando will assist in this effort as required.

Unmet Needs

Unmet needs refer to any needs that an individual, family and/or community needs that are normally part of the regular disaster assistance provided by County, State and/or Federal agencies. In the City of Orlando, the Office of Emergency Management will facilitate the designation of an Unmet Needs Coordinator with the City's Administration. The Unmet Needs Coordinator serves as the coordinator between governmental agencies and the private sector and Non-Governmental Organizations involved in the recovery effort. The types of unmet needs following a disaster might include:

- Rental assistance
- Emergency protection, repair, and rebuilding of homes
- Building supplies
- Volunteer labor

1. Information Sources

The City of Orlando utilizes a number of different methods to identify unmet needs following a disaster. Some of the information sources utilized include:

- Federal Emergency Management Agency
- Heart of Florida United Way
- 211 Community Resources
- American Red Cross
- Tri-County Volunteers Active in Disasters (VOAD)
- Florida Interfaith Network in Disasters (FIND)
- Hispanic Office of Local Assistance (HOLA)
- ESF #18 Business and Industry

2. Coordination with Partners

The Long Term Recovery/Unmet Needs Coordinator will coordinate with the affected neighborhoods based on the following criteria:

- Information is needed from the neighborhoods as to how many of their citizens have unmet needs
- Community Leaders has requested information on the number of individuals with unmet needs with their jurisdiction
- Individuals within their jurisdiction require some assistance from the municipality that cannot be met by the long term recovery/unmet needs organization (i.e., building permits, etc.)

3. Process for Unmet Needs

The following is the process in which citizens are referred to the Long Term Recovery/ Unmet Needs Organization:

- An individual approaches an NGO and /or faith-based group requesting assistance.
- The NGO or faith-based references them to either FEMA or handles the case internally.
- The individual, if denied by FEMA, will be referred back to the NGO or faith-based group that referred them and they will attempt to handle the unmet needs internally.

- If for some reason the NGO or faith-based group is not capable of meeting the needs of the individuals they will refer the case to the long term recovery/unmet needs organization.
- This organization will discuss the case amongst its members and match up the appropriate NGO or faith-based group with the case. The organization will facilitate collaboration among its member to meet the needs of the case.

Administration and Logistics

Disaster Recovery Centers

A Disaster Recovery Center (DRC) will be established in the immediate area to provide immediate “one-stop shopping” for information and tele-registration. The DRC is the Federal government’s primary mechanism for delivering disaster assistance information to disaster victims. OEM will provide State and Federal agencies with a list of location that can serve as fixed or mobile DRCs. FEMA guidelines for determining whether a facility may serve as a DRC include:

- Minimum of 5,000 square feet of floor space.
- Waiting area capable of accommodating 100 persons.
- Access for the disabled.
- Separate areas for child-care, crisis counseling, and first aid.
- Adequate parking.
- Located near public transportation systems.
- Adequate utilities and communications.
- Adequate restrooms and janitorial services.

The following are considerations that should be taken into account in opening and operating a DRC:

- In the aftermath of disasters, disruptions to the transportation system may make it difficult for many disaster victims to get to locations and sites where assistance information is available. To make it easier for individuals, one or more DRCs should be established.
- Once DRC locations have been confirmed, local State and Federal Public Information Officers (PIOs) will prepare a coordinated news release to advise disaster victims of the DRC locations, assistance programs available and any documentation necessary to support applications for disaster assistance.

Management and Operations

1. Once a Presidential Disaster Declaration has been issued, the Emergency Manager in cooperation with the Executive Policy Group will request from the State / County EOC the establishment of DRCs in the City of Orlando.
2. The FDEM will appoint a State Liaison for each DRC. The Liaison will work closely with the FEMA DRC manager in the establishment and daily operations of the DRC to ensure proper staffing.
3. DRC hours of operation will be determined jointly by the State and Federal Coordinating Officers.
4. The City of Orlando will maintain a constant representation in the DRC. OEM will act as the overall coordinator in cooperation with the State and Federal government on the overall operation and coordination of the DRC. Once the DRC is activated OEM will notify the appropriate agencies/organizations.

Training and Exercises

1. Training

As the primary agency for the Recovery Annex, OEM will develop a training program for their staff along with their support agencies. Courses at the State level will be coordinated through OEM.

2. Exercises

The OEM will work with the City of Orlando Emergency Management Team to exercise and test the Recovery Annex.

Table 38: Schedule of Recovery Functions (RFs and Purpose Statement)

RF # 1 Recovery & Redevelopment (The Vision)	To articulate the vision of redevelopment in both the anticipation and in the wake of a catastrophic natural disaster and to use opportunities presented by disaster and lessons learned to improve the community.
RF # 2 Economic Restoration & Development (Restoration of Business Community)	To establish a partnership between the City and the City's business Community to restore the City's economy following disaster.
RF # 3 Continuation of Government (COOP)	To ensure the continuing critical functions and services of the City government while responding to and recovering from disaster.
RF # 4 Reentry, Security	To promote and facilitate the timely re-entry of essential response and recovery, government officials, property owners, business owners, media, etc.
RF # 5 Public Information; Community Relation	The Public Information function will provide recovery information to citizens, City employees, businesses and organizations concerning disaster recovery operations and progress in reaching recovery milestones.
RF # 6 Volunteers & Donations	To continue to coordinate during recovery offers of assistance by volunteer organizations and work with federal and state organized efforts to collect and distribute donated goods and volunteer services.
RF # 7 Unmet Needs	To provide an Ombudsman to provide information, investigate complaints and to assist with disputes by directing citizens to the appropriate agency (ies) for resolution and to provide a means of identifying and resolving disaster recovery needs.
RF # 8 Debris Management	To effectively manage debris generated by natural and man-caused disasters.
RF # 9 Damage Assessment / Impact Analysis	To determine the disaster's impact on the City and to determine recovery priorities and identify resource needs for City disaster
RF # 10 Health (Long Term)	To identify threats to public health during the recovery period and to provide remedies.

RF # 11 Safety	To ensure that a safe and healthful working and living environment is maintained for City recovery personnel and others.
RF # 12 Repair & Restoration of Public Infrastructure, Services & Buildings	To return the public infrastructure and the City's services to pre-event levels or better.
RF # 13 Emergency Permits & Inspections	To provide an emergency permitting plan to streamline the permitting process in the event of a disaster.
RF # 14 Rebuilding, Reconstruction, Repairs, Restoration	To provide for the physical rebuilding of the community which may necessarily includes the viability of commercial operations to support the residents.
RF #15 Temporary Housing	To assist displaced people, emergency workers, businesses and the temporary workforce in locating temporary housing. To allow and/or coordinate the placement of temporary housing (housing that people occupy between the time they leave the emergency shelter and the time they are able to move back into their homes).
RF # 16 Human Services	To identify individuals who are in need of various human services following a disaster and to meet those needs through the coordination with public and private organizations.
RF # 17 Individual Assistance	To inform disaster victims about the federal individual assistance programs that are available and how to make application.
RF # 18 Environmental Concerns	To identify and implement projects or programs that restore, enhance or protect natural resources and open space (flood plains, wetlands, and wildlife) from degradation to reduce impacts from natural disasters.
RF # 19 Mitigation	To prepare a post-disaster hazard mitigation plan that will define actions during the recovery period that help prevent repeated future losses and reduce the City's vulnerability to natural hazards.
RF # 20 Recovery Administration & Finance	To provide a framework for implementing administrative and financial services necessary for disaster recovery.

RF # 21 Mutual Aid	To establish a Recovery Function (RF) to manage requests for mutual aid assistance for the City or to assist other local government.
RF # 22 Community Association Coordination	To provide a means to coordinate Disaster Recovery Programs between the City, Planned Unit Developments and Community Associations.

Annex II: Mitigation Functions

Introduction

The City of Orlando is an active participant of the overall Orange County Local Mitigation Strategy efforts. Mitigation efforts in the City of Orlando include activities, policies, or programs developed and adopted by Orange County Local Mitigation Strategy (LMS) Working Group that are intended to prevent, reduce, or eliminate the impact(s) caused by a disaster or emergency for the purpose of life safety, protection of private property and/or public infrastructure. Pre-disaster planning is required for determining the applicable hazards, vulnerable areas, probability of occurrence and overall risk to an area of the City.

The mitigation projects identified by the LMS Working Group should be effective and cost efficient measures that take an all-hazards approach, such as natural, man-made, and technological hazards. The overall goal of a robust hazard mitigation plan is to ensure that all mitigation activities, initiatives, and outreach programs to citizens and businesses are coordinated in an appropriate manner and provide for the reduction of vulnerability and promote a resilient community, strengthened critical infrastructure, and protect our key resources.

Orange County maintains an all-hazard, multi-jurisdictional LMS that was approved by the State of Florida Division of Emergency Management (DEM) Bureau of Mitigation and the Federal Emergency Management Agency (FEMA). The plan was adopted by the Orange County Board of County Commissioners and by the City of Orlando Council and will expire on February 26, 2015.

General Information

The Office of Emergency Management is the lead agency for mitigation activities within the county for pre-disaster and post-disaster scenarios. An Emergency Management Specialist is tasked with providing technical support, coordination, and liaison services between the Office of Emergency Management, the Orange County Local Mitigation Strategy Working Group, and the State of Florida Division of Emergency Management Bureau of Mitigation.

Various support agencies and organizations are members of the LMS Working Group and include, but are not limited to: county departments, municipal representatives, regional entities, non-profit organizations, private businesses, and interested members of the public.

The Concept of Operations for mitigation activities provides that the LMS Working Group oversees and maintains the LMS document, as well as the mitigation project priority list of mitigation activities in the County. The Working Group elects a Chair and Vice-Chair from its membership. There are also two committees to expedite the functions of the Working Group: the Steering Committee and the Planning Committee.

The Steering Committee is responsible for oversight and coordination of all actions and decisions by the LMS Working Group, such as formal actions, release of reports, development of resolutions, and issuance of position papers, as well as subcommittee assignments. The Planning Committee identifies, analyzes, and monitors the hazards threatening Orange County, defines actions to mitigate the impacts of those hazards, and evaluates and ranks mitigation projects submitted to the LMS Working Group for consideration.

The Emergency Management Specialist who serves as the LMS Coordinator is appointed by the Orange County Office of Emergency Management and is responsible for organizing mitigation activities with the LMS Working Group both pre- and post-disaster.

The Coordinator provides technical assistance to the Working Group and serves a liaison to the State of Florida Division of Emergency Management, Bureau of Mitigation for all LMS plan updates, annual reports, mitigation activities, and other correspondence. The LMS Coordinator is also responsible for overseeing the routine maintenance of the LMS Working Group, such as updating the mitigation project priority list, scheduling meetings of the Working Group, developing meeting agendas in conjunction with the Chair, keeping the meeting minutes, and revising the membership roster. The Coordinator will maintain a record of projects submitted to the Working Group, their status, and ranking. The LMS Coordinator is the main point of contact for the LMS Working Group on local mitigation activities within the County and to the State.

Currently, there are no formalized inter-local agreements, memorandums of understanding, mutual aid compacts, or other agreements that exist for other local or state government, volunteer, professional organizations or other individuals to assist in post-disaster mitigation activities. However, the Office of Emergency Management works with County Floodplain Managers from the Orange County Public Works Department, Stormwater Management Division to identify damaged structures in designated Special Flood Hazard Areas pre- and post-disaster. Determinations for damage costs are performed post-disaster on a case-by-case basis. The Floodplain Managers receive a list from the National Flood Insurance Program (NFIP) annually

with details on historical flood claims. These properties are geo-referenced and added to the City geospatial information system (GIS) platform to determine which properties lay in flood plains and which, if any, properties submitted claims. The Orange County Building Department inspects these properties post-disaster and calculates the amount of loss to the building. The formula used help to make a determination of loss based upon the amount of damage. A substantial loss is 50% of the market value of the property.

Orange County and the City of Orlando participate in the National Flood Insurance Program (NFIP). There are only two (2) that do not participate: Bay Lake and Lake Buena Vista (no Special Flood Hazard Area present).

Orange County's Office of Emergency Management is the lead agency responsible for coordinating mitigation activities in the County. As a result of this role, OEM is well positioned to identify opportunities for future mitigation projects such as shelter hardening, elevation and/or acquisition of repetitively flooded structures, drainage engineering projects, and other enhancement projects to critical infrastructure. OEM also works closely with ESF-19 Damage Assessment and the County Property Appraiser's Office. Following a disaster, ESF-19 organizes the assessment teams in the field and coordinates with the County Building Department for significant loss determinations. The municipalities each have a seat in the EOC as an Emergency Coordinating Officer (ECO) and can identify potential mitigation opportunities that can be submitted to the LMS Working Group for approval later on.

As the lead agency responsible for coordinating mitigation activities in the County, the Office of Emergency Management, with assistance from the LMS Working Group, oversees the implementation of mitigation assistance funds from federal, state, regional, and/or local government(s) that are awarded post-disaster. This funding may take various forms, including: Public Assistance (PA), the Hazard Mitigation Grant Program (HMGP), and/or Emergency Supplemental Community Development Block Grant Disaster Recovery Initiatives, as well as other emergency management grant programs. Other pre-disaster funds, such as Pre-Disaster Mitigation (PDM), Flood Mitigation Assistance (FMA) Grant Program, or Residential Construction Mitigation (RCM) Program, may be applied for and managed by another sponsoring agency outside of Emergency Management. Refer to the Financial Management Section of the CEMP for more information on potential funding sources for mitigation. Most emergency management grants have a 75% federal and 25% local financial contribution. A portion of the local match can be from in-kind sources, such as staff and volunteer time, equipment, storage space use, etc.

- Pre-Disaster Hazard Mitigation Activities

Orange County maintains an all-hazard, multi-jurisdictional LMS that was approved by the State of Florida Division of Emergency Management (DEM) Bureau of Mitigation and the Federal Emergency Management Agency (FEMA). The plan was adopted by the Orange County Board of County Commissioners in 2010 and will expire on February 26, 2015.

The LMS Working Group was established to serve as the representative community group to oversee mitigation activities in Orange County. During the most recent update of the LMS, the LMS Planning Team reviewed a number of existing plans, studies, and reports related to mitigation. The result was the incorporation of this information into the 2010 LMS Goals and Objectives (OC LMS, pg. 6-8) and to better reinforce the relationship between the LMS planning process and other County, Regional, and Municipal plans. Examples included growth management, land use, emergency management, etc. (refer to OC LMS, pg. 20 for a complete list of these other plans, studies, and reports).

The Mitigation Initiatives List (OC LMS, Appendix F) covers a list of completed mitigation projects performed since the last update. At the time of adoption in 2010, this list included projects such as: community education programs, disaster planning for businesses and neighborhoods, purchase of emergency generators and other equipment, structural retrofits, drainage and flood control, training classes, vegetative removal, etc. Please refer to the OC LMS Appendix F for the Completed Projects List.

The LMS contains a Hazards Analysis that identifies the various natural and man-made hazards that Orange County is vulnerable, as well as historical occurrences, probability, vulnerability, and severity of their impact.

The Mitigation Initiatives List (OC LMS, Appendix F) also contains a constantly changing list of prioritized mitigation projects to be performed based upon the Hazards Analysis. At the time of adoption in 2010, this list included projects related to: Equipment Modifications, Equipment Purchase, Personnel Training, Policy/Code Development, Property Acquisition, Public Education, Structural Retrofit, Structural, Other Structural, and Other Non-Structural projects (OC LMS, pg. 75-77). Each project addresses an identified hazard in order to reduce or eliminate the threats associated with the hazard.

In addition, a list of potential funding sources can be found on page 77. These funding sources include: HMGP, CDBG, FMAP, PDM, RCMP, UASI, etc.

- Specific Disaster Scenario Mitigation Functions

The Office of Emergency Management is the lead agency for providing emergency mitigation assessment within the county. Various support agencies and organizations that are members of the LMS Working Group would comprise the mitigation assessment team. ESF-19 Damage Assessment and the County Property Appraiser's Office will provide the raw data from their assessments conducted in the field. Other agencies with support roles include, but are not limited to: county departments like Public Works, Fire, Community, Environmental & Development Services, Utilities, and Health Services; municipal representatives; regional entities; non-profit organizations; private businesses; and interested members of the public.

As a result of its role, OEM is well positioned to conduct the mitigation assessment with assistance from supporting agencies and members of the LMS Working Group.

Following a disaster, OEM will collect information provided by ESF-19 during their damage assessments. Other county departments may be tasked to provide assistance during these evaluations. Depending upon the type of disaster and its magnitude, OEM may conduct mitigation assessments and damage determinations in conjunction with ESF-19, the FDEM Regional Coordinator, and/or the National Weather Service.

Supporting agencies and departments, municipalities, regional entities, non-profit organizations, interested members of the public, and/or other Emergency Coordination Officers (ECOs) will also provide damage estimates and report on impacted areas.

At the next regularly scheduled meeting, or following the disaster, this information will be presented to the LMS Working Group for analysis. Stakeholders will be able to submit new mitigation project applications for consideration or revise current projects.

The pending initiative(s) will be evaluated by the Planning Committee and prioritized accordingly. The Planning Committee will then make a recommendation for approval of the initiative to the Working Group. Sponsors of these projects will be responsible for submitting applications for mitigation grant funds post-disaster.

During mitigation assessment missions, ESF-19 will coordinate mitigation assessment in the County. Resource needs will be provided by ESF-19 initially; if other resources, material goods, or personnel are required, then ESF-19 will coordinate with ESF-7 Logistics. Supporting agencies will be tasked as appropriate. Mission tracking and resource requests will require coordination with other aspects of the EOC structure for incident management, such as ESF-5 Planning and ESF-7 Logistics.

The Orange County Property Appraiser's Office is the lead agency for ESF-19 will be responsible for maintaining and updating the mitigation assessment resource inventory list. The ESF-19 Standard Operating Guide (SOG) and the corresponding ESF-19 Annex contains further information on the maintenance of the resource inventory and includes information on personnel, data, equipment, and vehicles to be used for damage assessment.

The following list contains some of the planning assumptions considered in the development of damage and mitigation assessment activities. The intention of these assumptions is to identify certain resource limitations, including those of personnel and/or equipment. Other issues are related to access to areas of the County that may be severely damaged and assessments will not be able to be conducted until they are cleared.

1. All resources and equipment under the control of the Board of County Commissioners needed for damage assessment shall be made available to ESF #19 upon implementation of the Comprehensive Emergency Management Plan (CEMP).
 - a. A disaster and/or emergency may cause significant damage to Orange County businesses, homes, and infrastructure.
 - b. Damage assessment teams operations may be hampered by blocked roads and damaged infrastructure.
 - c. Adequate and thorough damage assessment surveys will be needed in order to request and receive State and Federal disaster assistance.

While life safety issues will be addressed immediately, many of the mitigation opportunities that will arise in Orange County may not be fully known for several weeks or months following a disaster. It is important that damage assessment teams be mindful of mitigation concerns that may need to be addressed during the recovery phase of an incident. The training procedures for damage and mitigation assessment teams are listed in the ESF-19 Annex:

1. It is the responsibility of each agency to assess, develop, and implement a training program for all personnel assigned responsibilities in this ESF.
2. It is the responsibility of each agency to coordinate and track compliance with NIMS related training.

3. Each agency must ensure that sufficient personnel are trained to perform their assigned duty on a 24-hour basis and that all key positions have a depth of three persons.
4. Training must be conducted for public, private, non-profit, and volunteer personnel.

Generally speaking, the Manager of Fiscal & Business Services will be responsible for completing and submitting applications for federal and state disaster mitigation funding on behalf of Orange County. Other County and municipal departments and agencies may submit independent applications for mitigation funds. However, it is recommended that these project applications be supported by the Orange County Local Mitigation Strategy Working Group as it is a requirement for many of those funding sources. ESF-14 Public Information, in coordination with the primary agency of Orange County Communications, will provide citizens with information concerning damage prevention and recovery prior to, during, and following a disaster event. This information may be provided through larger public information systems, such as a Joint Information Center (JIC) or Disaster Recovery Centers. ESF-14 will also provide pertinent information to the media, including television, radio, print, and online outlets, so as to reach the largest population possible in order to help mitigate all of Orange County.